AUGUST 26, 1937

THE IRON AGE

AGRICULTURE-ENGINEERING LIBRARY

. . . to make

Good Bearings Better

● After more than forty years' experience in precision manufacturing, the paramount objective at New Departure remains unalterably the same—to make good bearings better. Today, or in the future when you specify New Departure ball bearings for your machines, you may do so with complete confidence that they represent the best that human skill, superfine materials and ultra modern equipment have yet produced.

NEW DEPARTURE

LIBRARY
WEST VIRGINIA UNIVERSITY 2587

High-Nitrogen Ferrochrome

improves High-Chromium Steel Castings

HIGH-NITROGEN ferrochrome adds both nitrogen and chromium to steel. A small amount of nitrogen in cast steels which contain over 20 per cent chromium greatly refines grain size, reduces objectionable grain growth at high temperatures, materially improves strength and toughness without sacrificing ductility and effects a slight increase in hardness.

For example, a 25 per cent chromium-10 per cent nickel alloy steel, treated with nitrogen, showed a tensile strength of 22,500 pounds per square inch and an elongation of over 10 per cent in 2 inches at 1,600 degrees Fahrenheit after being held for one hour at that temperature.

Electromet metallurgists will gladly explain the advantages of high-nitrogen ferrochrome and tell you the best ratio of nitrogen to chromium for your application. Write for full data.

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

Carbide and Carbon Building, 30 East 42nd St., New York

AG-ENG LIB.
ENG
ING
V. 140
NO. 9
AG 26 1937

High-nitrogen ferrochrome is especially advantageous in making high-chromium steel castings for heat exchangers, cracking stills, and other high-temperature applications.

CHROMIUM
Low-Carbon Ferrochrome (in grades, maximum 0.06% to maximum 2.00% carbon)
High-Carbon Ferrochrome (maximum 6.00% carbon)
High-Nitrogen Ferrochrome
Chromium Metal
Chromium-Copper
Miscellaneous Chromium Alloys

CALCIUM
Calcium-Silicon
Calcium-Aluminum-Silicon
Calcium-Manganese-Silicon

ZIRCONIUM
12 to 15% Zirconium
35 to 40% Zirconium
Aluminum-Zirconium

SILICO-MANGANESE
All grades including Silico-Spiegel

MANGANESE
Standard Ferromanganese 78 to 82%
Low-Carbon Ferromanganese
Medium-Carbon Ferromanganese
Spiegeleisen
Manganese Metal
Manganese-Copper
Miscellaneous Manganese Alloys

PRODUCTS OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

SILICON
Ferrosilicon 15%
Ferrosilicon 50%
Ferrosilicon 75%
Ferrosilicon 80 to 90%
Ferrosilicon 90 to 95%
Refined Silicon (minimum 97% silicon)
Miscellaneous Silicon Alloys

VANADIUM
All grades

BRIQUETS
(Patented)
Chrome Briquets
Manganese Briquets
Silicon Briquets

COLUMBIUM

TUNGSTEN

Electromet
Ferro-Alloys & Metals

See the Electromet Exhibit at the National Metal Show, Atlantic City Auditorium, Atlantic City, N. J., October 18-22, 1937. Booth G-62

THE IRON AGE, published every Thursday by the *CHILTON CO. (INC.)*. Publication Office, Chestnut & 56th Sts., Philadelphia, Pa. Editorial and Executive Offices, 239 W. 39th St., New York, N. Y. Entered as second class matter November 8, 1932, at the Post Office at Philadelphia under Act of March 3, 1879. $6.00 a year in U. S., Canada $8.50, Foreign $12.00. Vol. 140, No. 9.

FINE CRAFTSMANSHIP FOR *Custom Made* QUALITY

Behind every fine product is a story of long experience, careful development and acquired skill. So it is with Ludlum steels, the product of 83 years of metallurgical progress, modernized methods and trained craftsmanship.

Whether the steel you need is a stock item or a special analysis, the one recommended by Ludlum will meet your requirements *exactly*.

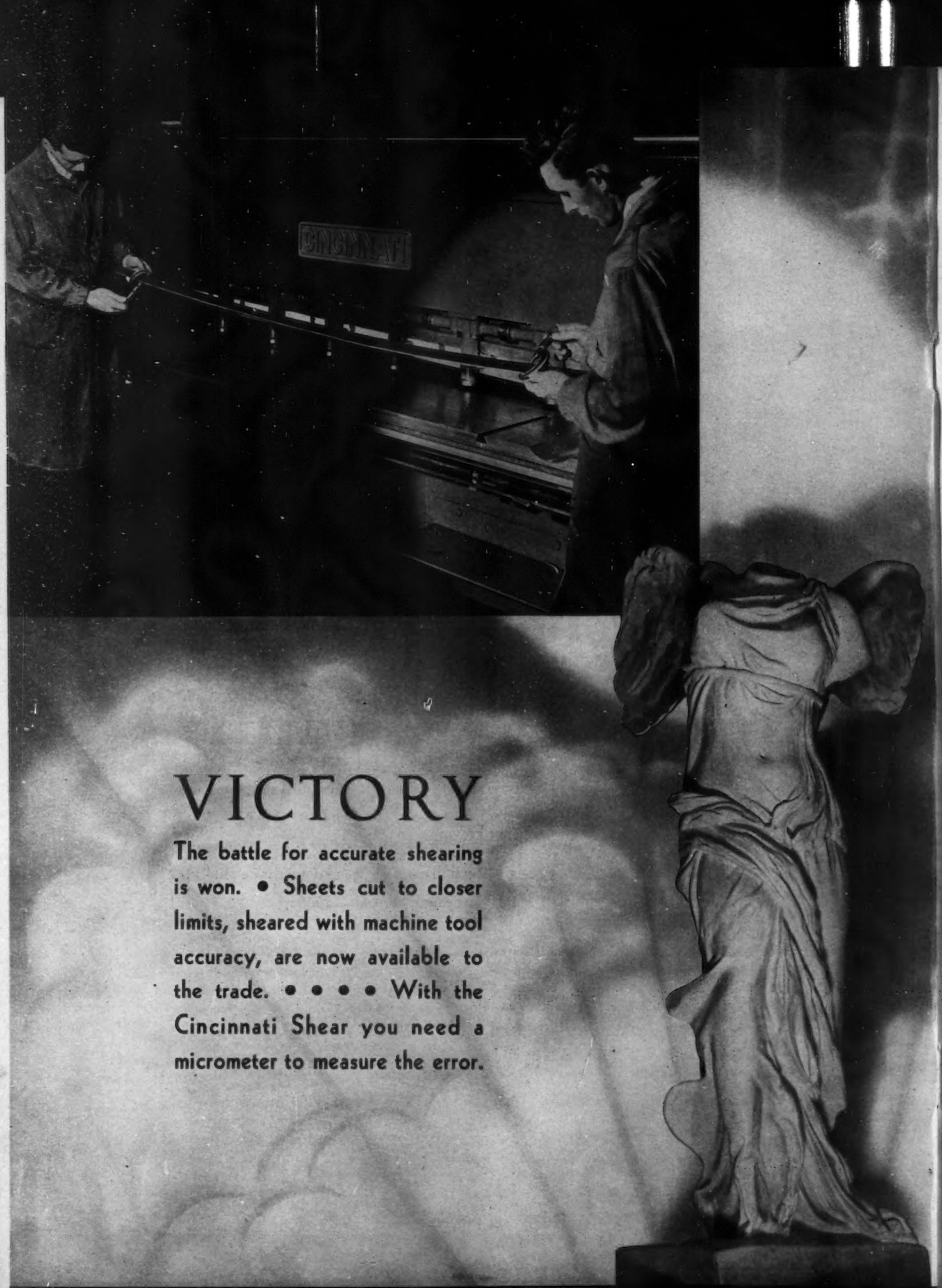
Ludlum fits the steel to the job for manufacturers who are seeking higher production and reduced time losses. A typical saving was effected for a Maryland customer on seaming rolls for cans used to pack tomato juice. In place of the case hardened steel formerly used, a Ludlum alloy of high resistance to wear and distortion was substituted. The new rolls ran for 40 days on 2,858,444 cans—*nearly three times* the run obtained with case hardened steel—and freedom from corrosion was also secured.

Without obligation, refer *your* problems to Ludlum . . . Just drop a line to Research Department, Ludlum Steel Company, 826 A Street, Watervliet, N.Y.

LUDLUM

FINE STEELS SINCE 1854

TOOL · STAINLESS · CARBON · ALLOY

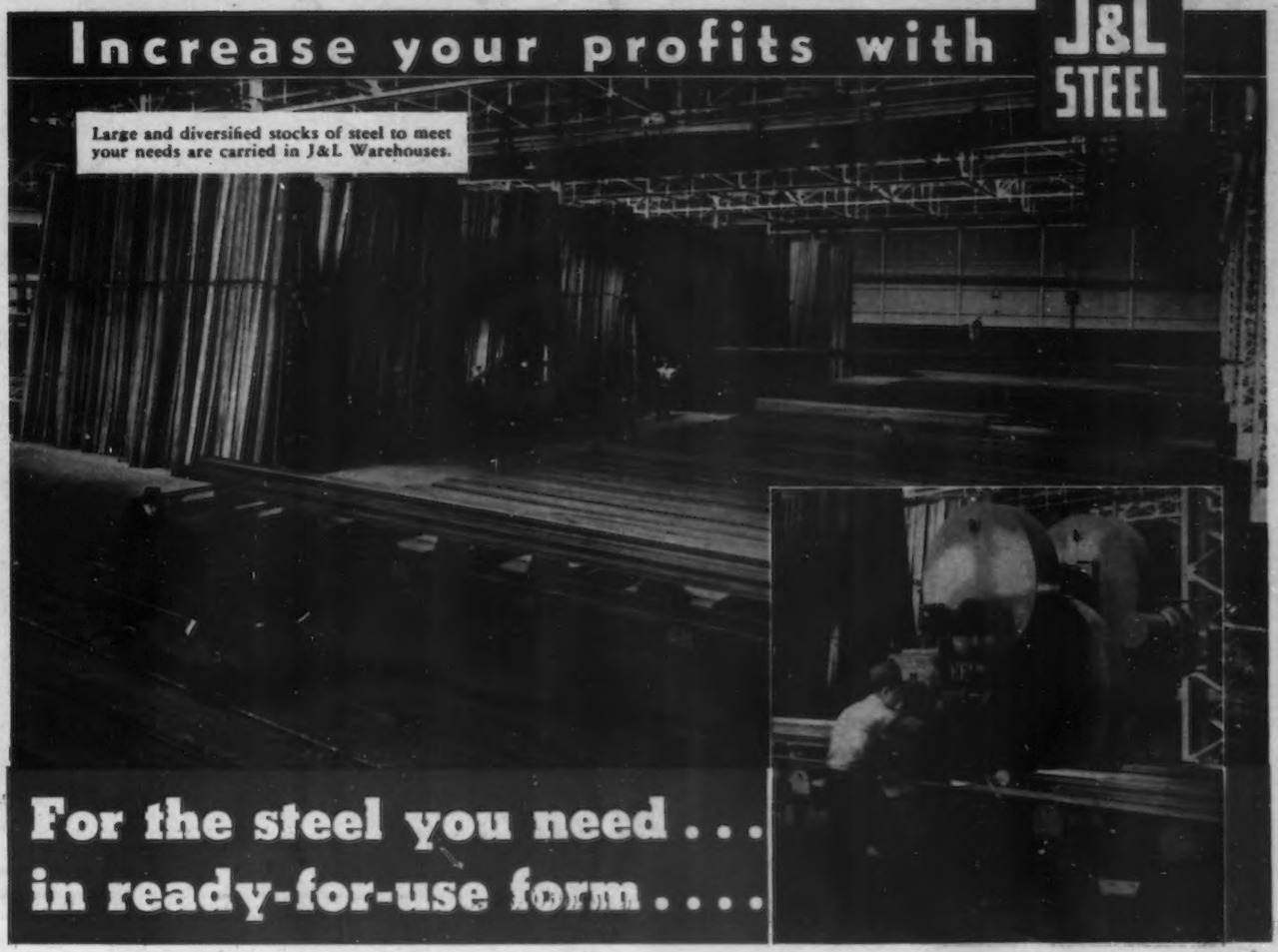


VICTORY

The battle for accurate shearing is won. • Sheets cut to closer limits, sheared with machine tool accuracy, are now available to the trade. • • • • With the Cincinnati Shear you need a micrometer to measure the error.

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

Increase your profits with J&L STEEL


Large and diversified stocks of steel to meet your needs are carried in J&L Warehouses.
For the steel you need . . .
in ready-for-use form . . . .

Call your J & L Warehouse

The Jones & Laughlin Warehouse near you carries large and complete stocks of high quality steel products to meet your every need . . . to help you serve your present customers and gain new ones.

You get steel quickly . . . dependably . . . in *ready-for-use form.* J&L Warehouses are fully equipped with modern machines for bending, cutting, welding and fabricating. By ordering from your nearest J&L Warehouse, you save money and prevent costly delays . . . you get high quality steel *on time.*

Steel users, large and small, find Jones & Laughlin Warehouse Service economical . . . fast . . . complete . . . dependable, for regular or emergency needs. Save money and valuable time. Order from *your* J & L Warehouse.

Write today on your letterhead for your copy of the J&L Warehouse Stock List.

JONES & LAUGHLIN STEEL CORPORATION · PITTSBURGH

MAKERS OF HIGH QUALITY IRON AND STEEL PRODUCTS SINCE 1850

J&L WAREHOUSES

PITTSBURGH · CINCINNATI · DETROIT · NEW ORLEANS · CHICAGO

NEW YORK · . . . Jersey City, Newark, Albany

. . . Memphis . . . Greenville, S. C. . . . Chattanooga . . . Louisville . . . Cleveland . . . Buffalo . . . Philadelphia . . . Boston

FOR EVERY NEED . . . THE RIGHT QUALITY OF STEEL IN A FULL RANGE OF SIZES

Why not make it of

STEEL?

The Container Industry did . . . . and Revolutionized Product Distribution

IN this Age of Change, nothing has altered more drastically and dramatically than distribution. The movement of products from farm and plant to market, home, and shop has been revolutionized by the Container Industry, working through the responsive medium of Steel. Cans and pails, tanks and boxes, cases and drums, bring food for the table—oil for the car—paint for the house—tobacco for the pipe —a bewildering variety of products of common use, that are safely preserved and better protected . . . because of Steel.

And so again Steel demonstrates its great contribution to the safety and comfort and enjoyment of every-day living — re-demonstrates its adaptability to countless diverse applications.

Great Lakes Steel Corporation keeps pace with a constantly expanding list of uses for Steel, by continuous development. Hot and Cold Rolled Sheets, up to 90″ wide and 5/16″ gauge, offer a latitude in size and analysis that has helped many manufacturers to solve difficult production problems. If you are considering new product design, or old product re-design, why not investigate what Great Lakes Steel can do for you?

GREAT LAKES STEEL CORPORATION, DETROIT, MICHIGAN

DISTRICT OFFICES: *Boston*, 1001 Statler Bldg.; *Chattanooga*, Hamilton Bank Bldg.; *Chicago*, 1026 Builders Bldg.; *Cleveland*, 820 Leader Bldg.; *Philadelphia*, 605 Liberty Trust Bldg.; *St. Louis*, E. R. Hensel Co., Cotton Belt Bldg.; *San Francisco*, Sharon Bldg.; *Toronto*,

UNIT OF NATIONAL

NATIONAL STEEL

ACIDS • ALCOHOL • ALUMINUM PAINT • AMMONIA • ANIMAL DIP
ANIMAL SPRAY • ASPHALTUM • ANTI-FREEZE SOLUTION • ASBESTOS
CEMENT • ADHESIVE PASTE • BENZOL • BLACK STRAP • BORAX • BUTTER
OLORING • EDIBLE • COLORS • CARBON
EMOV ATER PAINTS
LORS CHROME ORE
SINFE ZERS • FOOD
RODU OSE • GLUE
YCER IN • HONEY
D, PRINTERS'
RICATING OIL
ID COLORS • MALTS
OT, WHALE, MEDICINAL
FINE • VEGETABLE:
N SEED, LINSEED,
UME • PAINT
BY-PRODUCTS
POP SEA • POWDERS
LEY DRESSING • PARIS GREEN • RUBBER

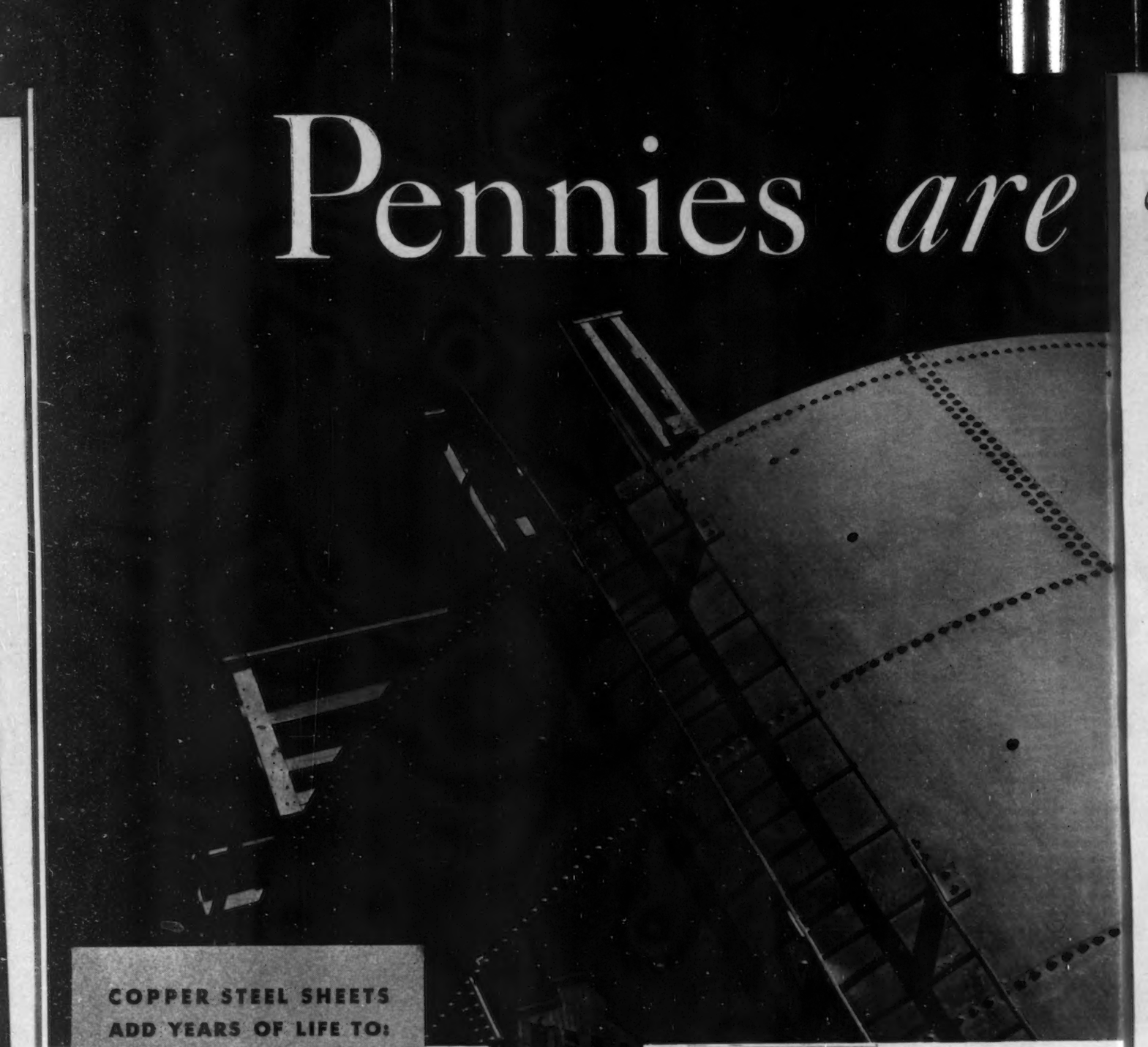
The number and variety of products packaged in steel-containers is suggested by the partial list of uses above. The illustration shows some typical refinements that provide quick-acting, positive seals; permit agitation of sedimentary materials; simplify pouring, etc.

Bldg.; *New York*, 500 Fifth Avenue
Ontario, General Assurance Building.

HOT ROLLED STRIP...CARBON STEEL BARS...PLATE...SPRING STEEL...BILLETS...COLD ROLLED SHEETS ...PICKLED SHEETS...BLACK SHEETS...MICHIGAN METAL FOR VITREOUS ENAMELING...*Widths up to 90"*

STEEL CORPORATION

Pennies *are*



COPPER STEEL SHEETS ADD YEARS OF LIFE TO:

Air Conditioning Equipment
Buckets
Caskets
Construction Equipment
Gutters
Hoods & Housings
Ice making equipment
Marine equipment
Roofing & Siding
Refrigerators
Ranges
Signs
Spoutings
Skylights
Silos
Tubs
Tanks
Ventilators
Washing Machines

Tanks and containers exposed to alternate wet and dry conditions will save many times the slight extra cost of U·S·S Copper Steel through longer life and less maintenance.

Two roofs for the price of one. Roofing and Siding constantly exposed to corrosive industrial atmosphere last more than twice as long when made from U·S·S Copper Steel.

225 tons of U·S·S Copper Steel Galvanized Sheets went into this ventilating system. For all types of air conditioning equipment that must stand humidity, copper steel is the most durable material to use.

worth Dollars

when spent for Copper Steel Sheets

A LITTLE COPPER ADDED TO STEEL MORE THAN DOUBLES ITS RESISTANCE TO CORROSION

WHEREVER steel sheets are exposed to atmospheric corrosion, the slightly increased cost of U·S·S Copper Steel is worth many dollars in terms of longer life. Countless service installations and laboratory tests during the past 22 years definitely prove the superior rust resistance of copper steel. A well-known chemical engineer says, "I do not know of a single instance in which copper bearing steel has not outlasted every other type of commercial iron or steel available."

U·S·S Copper Steel Sheets are unsurpassed for use in roofing, siding, culverts, air conditioning equipment, tanks, barrels, drums, tubs and a host of other products. Outside or inside, where conditions are alternately wet and dry, the endurance and money-saving advantages of U·S·S Black and Galvanized Sheets are too important to be overlooked.

United States Steel Engineers originally developed copper steel. As other improvements were demanded, they met the requirements with better sheet steels. Today our mills are equipped with the most modern machinery to produce any type of steel required.

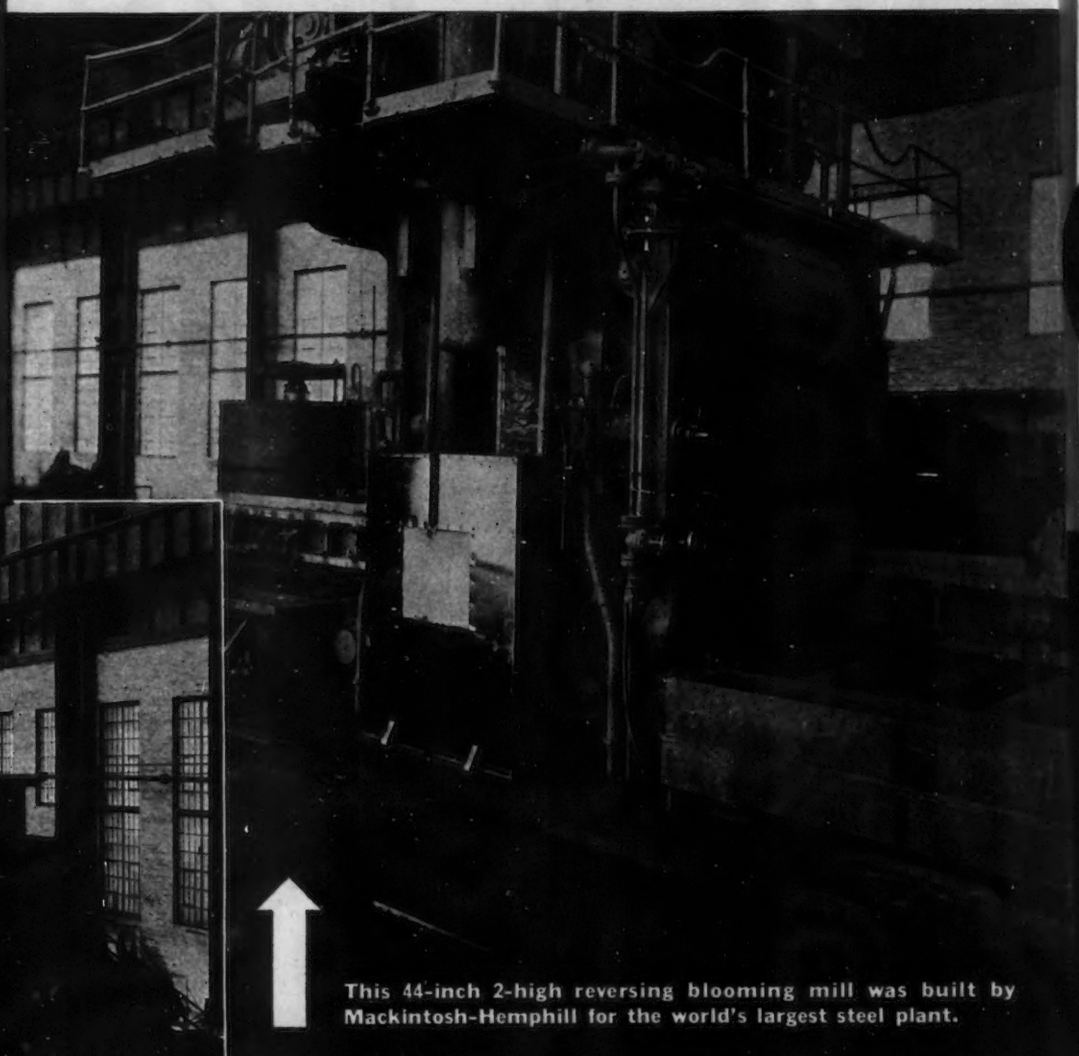
U·S·S Copper Steel Sheets can be readily formed and fabricated and are adapted to all uses when increased resistance to corrosion is important.

U·S·S COPPER STEEL SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION · *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY · *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY · *Birmingham*
United States Steel Products Company, New York, Export Distributors

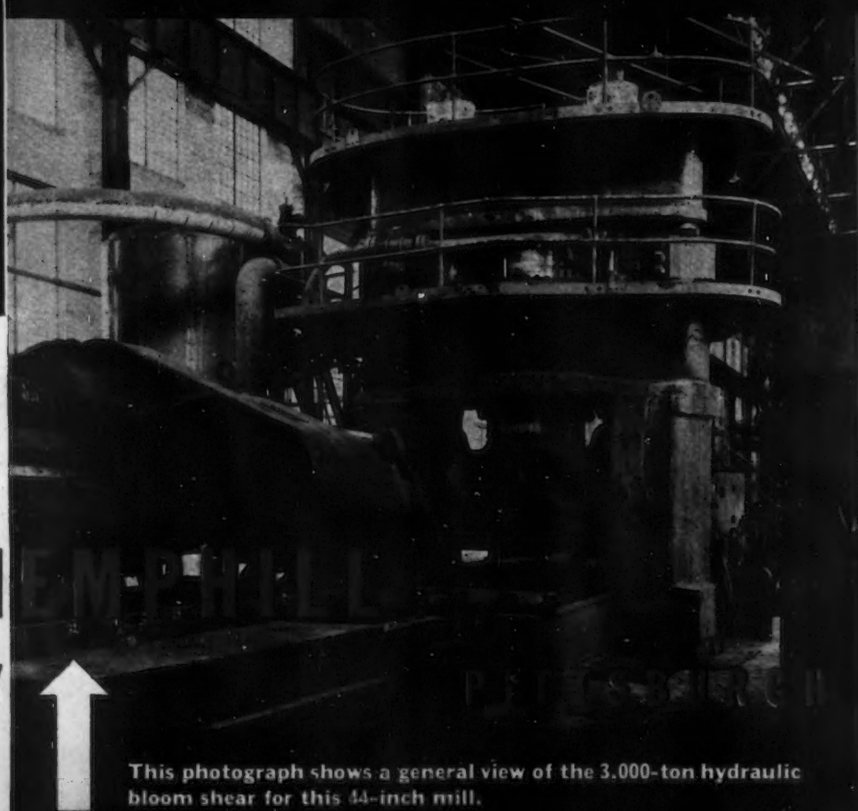
UNITED STATES STEEL

THE WORLD'S LARGEST STEEL PLANT



This 44-inch 2-high reversing blooming mill was built by Mackintosh-Hemphill for the world's largest steel plant.

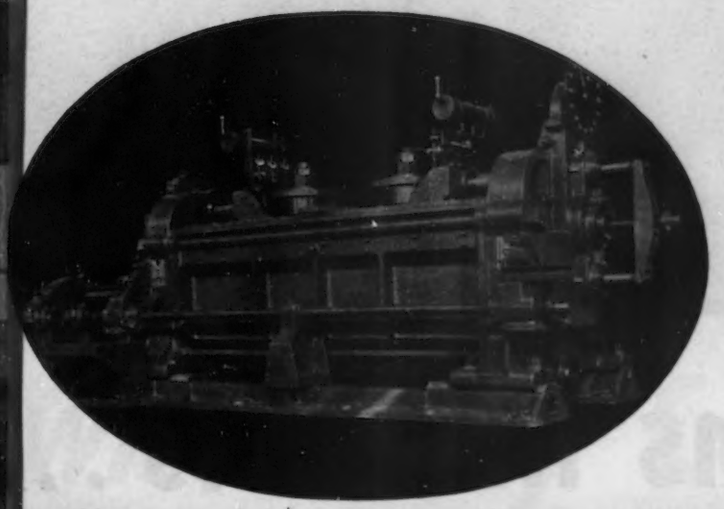
These mill tables were built by Mackintosh for the 44-inch blooming mill shown above.



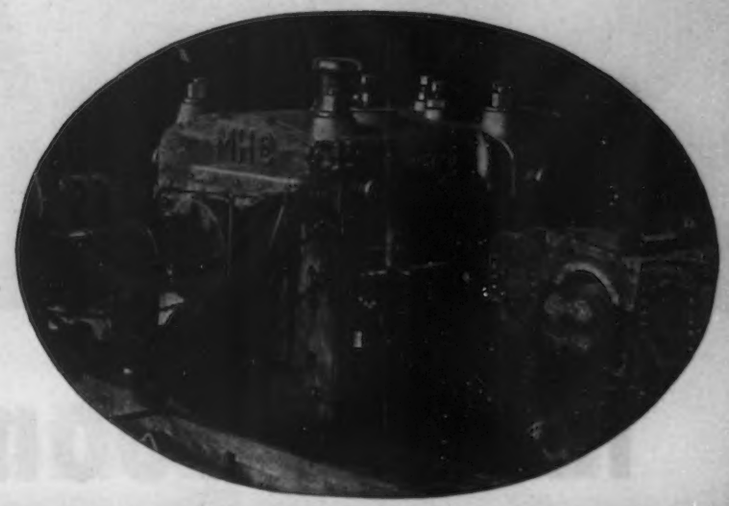
This photograph shows a general view of the 3,000-ton hydraulic bloom shear for this 44-inch mill.

MACKINTOSH-H
COMPANY

THE WORLD'S LARGEST STEEL PLANT



This close-up shows the details of an edging mill built by Mackintosh for the world's largest steel plant.



Mackintosh built these speed-reducing pinions for the forming pass of the rail mill in the world's largest steel plant.

MACKINTOSH IS CASTING MANY OF THE ROLLS FOR THE WORLD'S LARGEST STEEL PLANT...

Exceptionally high tonnages are being rolled on Special Alloy Steel Rolls which have recently been developed by Mackintosh-Hemphill for Blooming Mills.

Freedom from fire-cracking has been characteristic of rolls cast by Mackintosh-Hemphill for Strip Mills.

Comparable qualities are present in the Mackintosh Rolls for sheet, bar and billet mills and for other kinds of rolls.

Mackintosh can produce a roll for every type of mill, with exactly the qualities you need for any stand.

Mackintosh experience in the making of rolls for more than 130 years and in the designing and manufacture of much steel mill machinery enables this company to produce exceptional qualities in rolls.

Let us talk over your roll problems with you.

STEEL CASTINGS

MACKINTOSH-HEMPHILL IS EQUIPPED TO MAKE ALL TYPES OF STEEL CASTINGS, OF ALL SIZES

AND MIDLAND, PA.

In tool rooms like this ..

...wheels by Carborundum

REG. U. S. PAT. OFF.

The right grinding wheel for every job

● GRINDING out a new chapter in the history of tool room practice are the Aloxite Brand Aluminum Oxide "AA" Wheels and also the mighty successful "270" Bond Wheels. The "AA"—the White Wheels—are for your more precise, particular jobs on special tools. These clean, free, and cool cutting wheels are decidedly flexible in their application. They have the ability to take light or heavy cuts over wide areas of contact with the same free cutting action, and they are adaptable to the grinding of a wide variety of steels. In the "270" Bond Wheel you have much the same properties, combined with certain qualities which make it the perfect high production wheel for duplicated work.

Then of course when it comes to the grinding and conditioning of cemented carbide tools you have but to remember the success of Carborundum Brand Green-Grit Silicon Carbide Wheels and the Carborundum Brand Diamond Wheels. Send for interesting informative books "A Treatise on Tool Room Grinding" and "A Treatise on Grinding of Cemented Carbides". Both will be sent free.

CARBORUNDUM
REG. U. S. BRAND PAT. OFF.

ABRASIVE PRODUCTS

THE CARBORUNDUM COMPANY
Niagara Falls, N. Y.

Sales Offices and Warehouses in New York, Chicago, Boston, Philadelphia, Cleveland, Detroit, Cincinnati, Pittsburgh, Grand Rapids

(Carborundum and Aloxite are registered trade-marks of The Carborundum Company)

Better Service.. AT LESS COST AND EFFORT..

FCC Air Hardening Tool Steel Cast to Shape delivers the job to you already half done. With only ⅛-inch of trim to be machined off, even on the most intricate shapes, your dies can be put into production more quickly and at great savings to you.

FCC Air Hardening Tool Steels are produced in a variety of analyses, each possessing distinctive properties. These alloys offer unusual resistance to wear and abrasion. Because of uniform quality, the result of laboratory control from analysis to annealing, they are readily machined, tapped and drilled.

FCC Air Hardening Tool Steels are specially adapted to all kinds and sizes of blanking, forming, drawing, swaging and embossing dies, to bushings, cams, anvils, shears, rolls and to many other purposes.

Write for the FCC Book, detailing special analyses, properties, applications and other useful data.

THE FORGING AND CASTING CORPORATION

FERNDALE · MICHIGAN

COMPOSITE STEEL DIES · TOOL STEEL CAST TO SHAPE
TOOL AND ALLOY STEEL FORGINGS · NITRI-CAST-IRON

BRACE-MUELLER-HUNTLEY, INC.
Buffalo, N.Y. Rochester, N.Y. Syracuse, N.Y.
EDGCOMB STEEL COMPANY
Philadelphia, Pa.
EDGCOMB STEEL CORPORATION
Newark, N. J.

Distributors

LUDLUM STEEL COMPANY
Chicago, Ill. Cleveland, Ohio
Los Angeles, Calif. Pittsburgh, Pa.
St. Louis, Mo. Springfield, Mass.
San Francisco, Calif.

MOORE-HANDLEY HARDWARE CO.
Birmingham, Ala.
RUTLAND SUPPLY COMPANY
Rutland, Vt.
F. A. SEEGER
P. O. Box 1047, Atlanta, Ga.

CHANGE TO YOLOY INCREASES PAYLOAD 25%

Youngstown Alloy adds 2 cubic yards to payload of Gar Wood hydraulic scraper, decreases fatigue failures, increases corrosion resistance

More profitable capacity because of lighter weight . . . longer life because of greater strength and corrosion resistance . . . better service because of less metal fatigue — all these are assured when you build or buy equipment made of Yoloy, the special nickel copper alloy of Youngstown Sheet and Tube.

Gar Wood Industries found they could increase the payload of their 10-yard road scraper by two cubic yards of pay dirt, increase strength 10% to 20%, and minimize corrosion and fatigue — all because of Yoloy's extraordinary strength in light weights.

The day of ponderous tonnage for powerful machinery is ended. You who rightly buy machinery on profit, not pounds, will want the whole story of Yoloy's remarkable features. Write for full data on how Yoloy can assure more production, longer life, more net profit in your equipment because of its lighter weight, greater strength.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels · GENERAL OFFICES: YOUNGSTOWN, OHIO

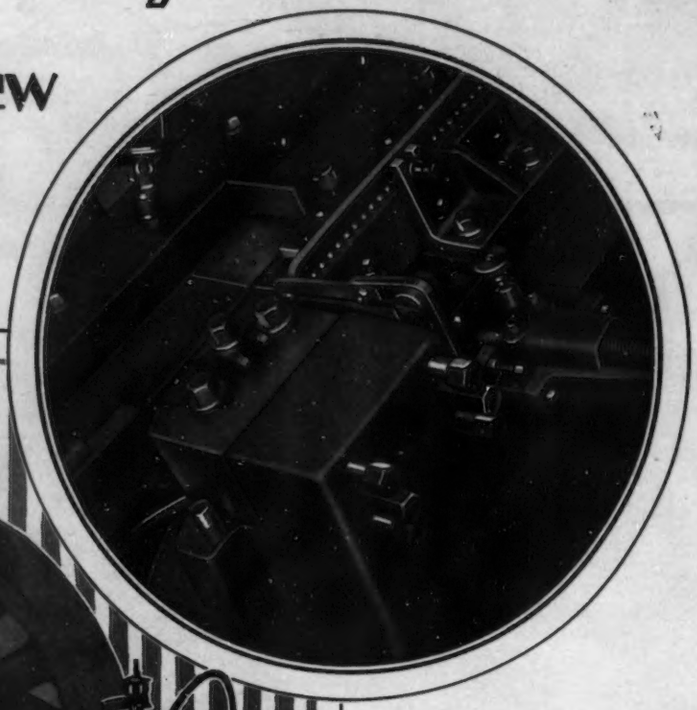
HIGH-TENSILE STEEL YOLOY IS AVAILABLE IN SHEETS, STRIPS, PLATES, BARS, SHAPES, MANUFACTURERS' AND WELDING WIRE, SEAMLESS AND ELECTRIC WELD PIPE.

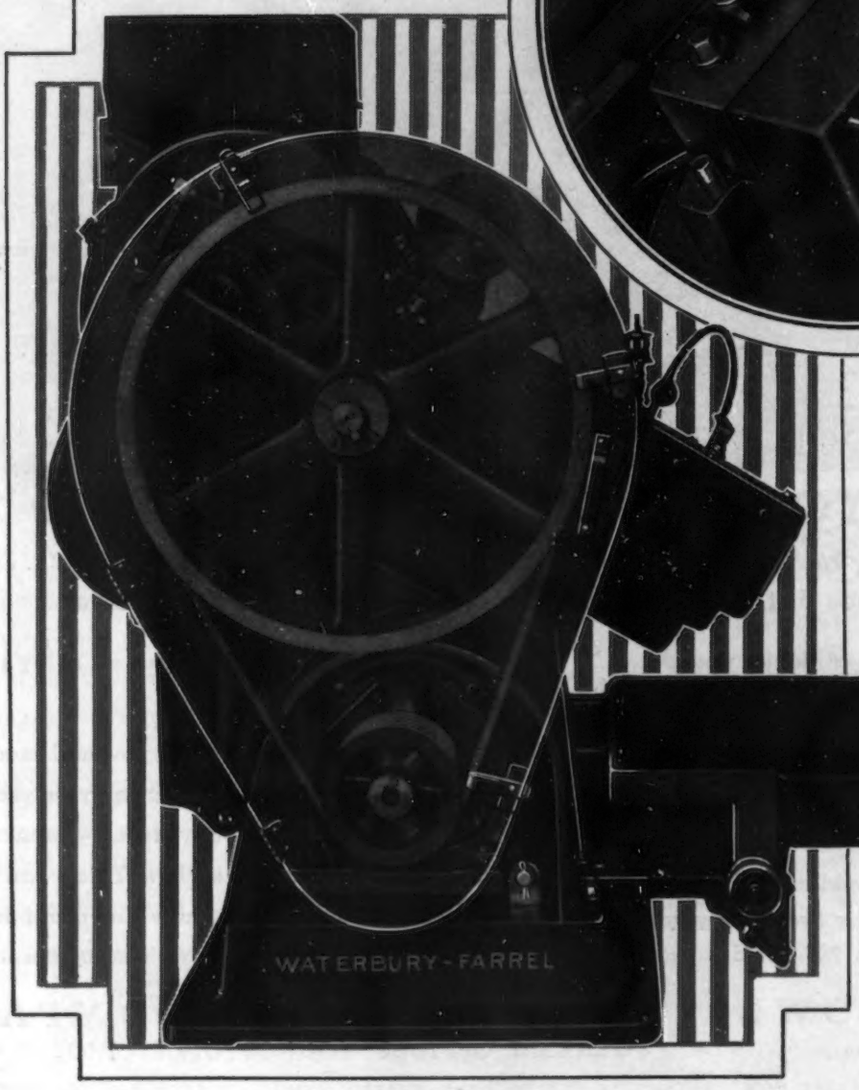
3-1

YOUNGSTOWN

Waterbury-Farrel

Automatic Screw Thread Rolling Machines...





On these machines, screw threads are produced by rolling the blanks between two dies—one stationary and the other reciprocating — like rolling a pencil between the palms of the hands. Accuracy in lead and thread form is characteristic of this method of threading. The blanks are fed from a hopper, down an inclined chute and thence to the dies.

Maximum size automatic, 5/8" diameter, 4" threaded length; hand machine, 1" diameter, 5" threaded length.

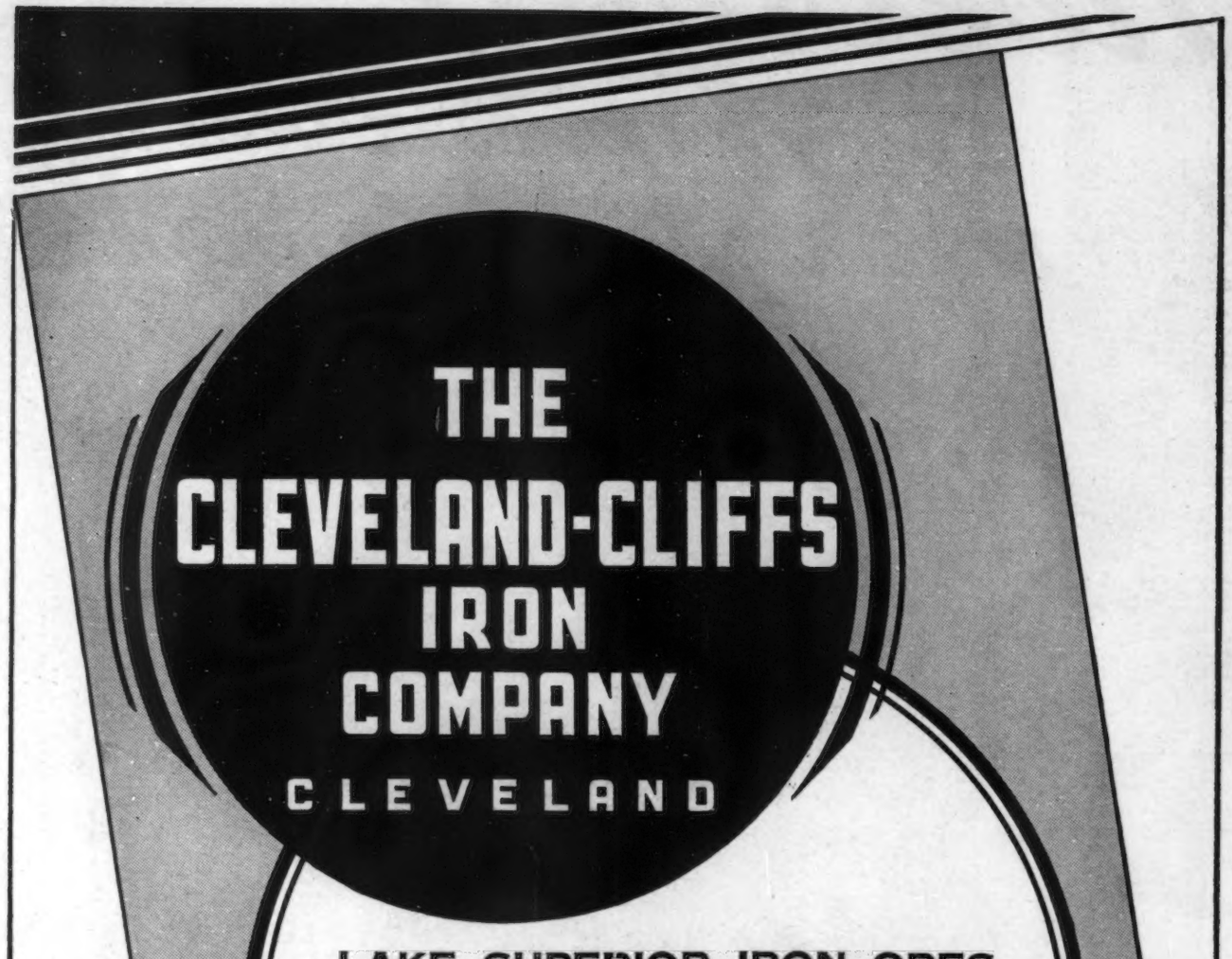
Illustration shows 3/8" automatic, rated at 75 per minute for work of average length.

The Waterbury Farrel Foundry and Machine Co

MACHINERY FOR BOLTS, SCREWS, RIVETS. NUTS. RODS, SPOKES, ETC.

HOME OFFICE AND WORKS: Waterbury, Conn. SALES OFFICES: Cleveland, Chicago and Newark, N. J.

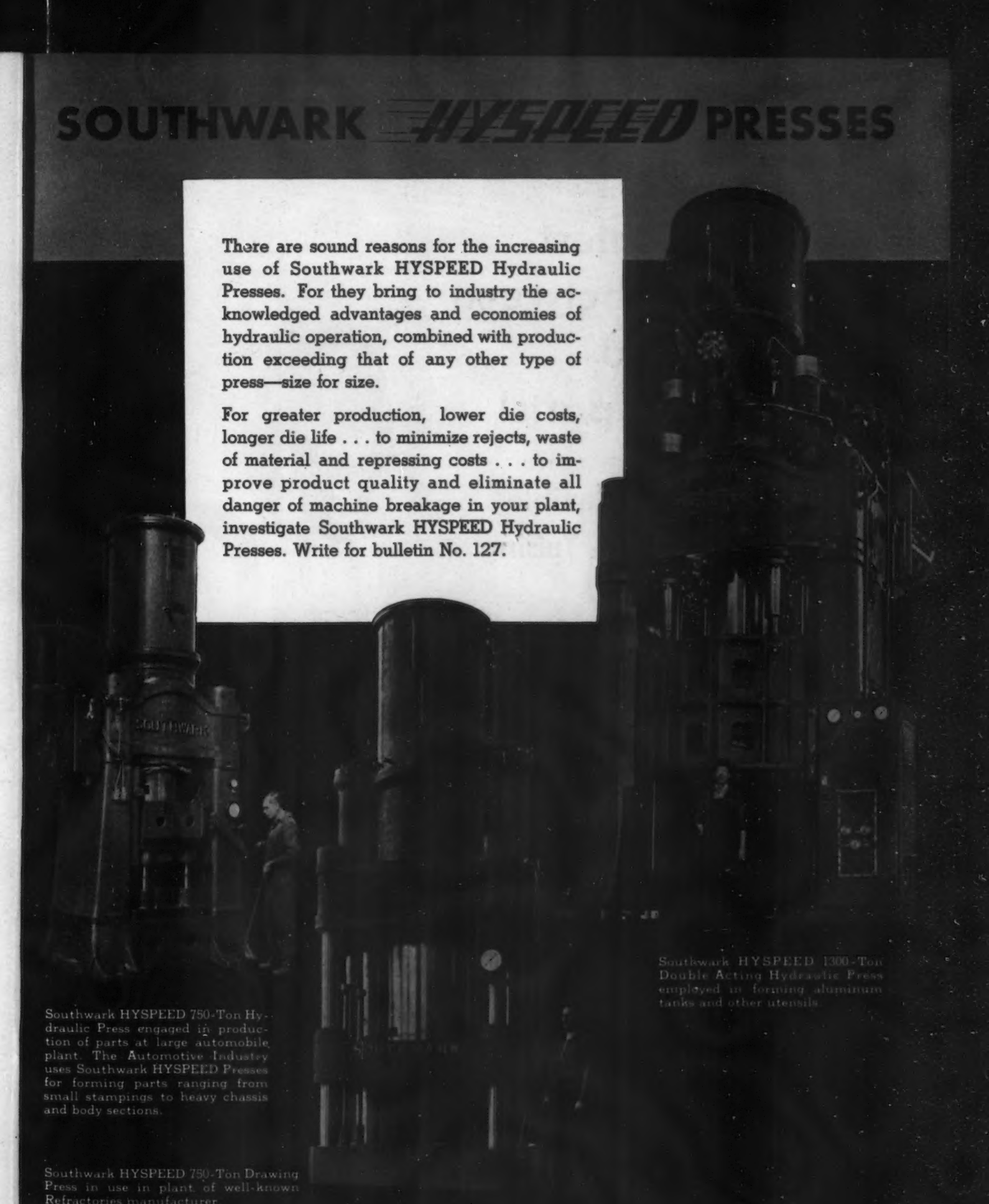
Roebling...
The pacemaker in
wire rope development
THE most exacting basis for judging wire rope performance is AVERAGE SERVICE.
This is the basis advocated by Roebling, in which rope cost per ton of material handled, or per other unit of service measurement, is based not on the service of a single rope but on the *average* service of several ropes.
John A. Roebling's Sons Co.,
Trenton New Jersey


THE
CLEVELAND-CLIFFS
IRON
COMPANY
CLEVELAND
LAKE SUPERIOR IRON ORES
OF ALL GRADES
CLIFFS SHAFT LUMP ORE
FOR OPEN HEARTH
FURNACES
COAL FOR ALL
REQUIREMENTS
CCC

SOUTHWARK HYSPEED PRESSES

There are sound reasons for the increasing use of Southwark HYSPEED Hydraulic Presses. For they bring to industry the acknowledged advantages and economies of hydraulic operation, combined with production exceeding that of any other type of press—size for size.

For greater production, lower die costs, longer die life . . . to minimize rejects, waste of material and repressing costs . . . to improve product quality and eliminate all danger of machine breakage in your plant, investigate Southwark HYSPEED Hydraulic Presses. Write for bulletin No. 127.



Southwark HYSPEED 1300-Ton Double Acting Hydraulic Press employed in forming aluminum tanks and other utensils.

Southwark HYSPEED 750-Ton Hydraulic Press engaged in production of parts at large automobile plant. The Automotive Industry uses Southwark HYSPEED Presses for forming parts ranging from small stampings to heavy chassis and body sections.

Southwark HYSPEED 750-Ton Drawing Press in use in plant of well-known Refractories manufacturer.

BALDWIN-SOUTHWARK CORPORATION

SOUTHWARK DIVISION, PHILADELPHIA

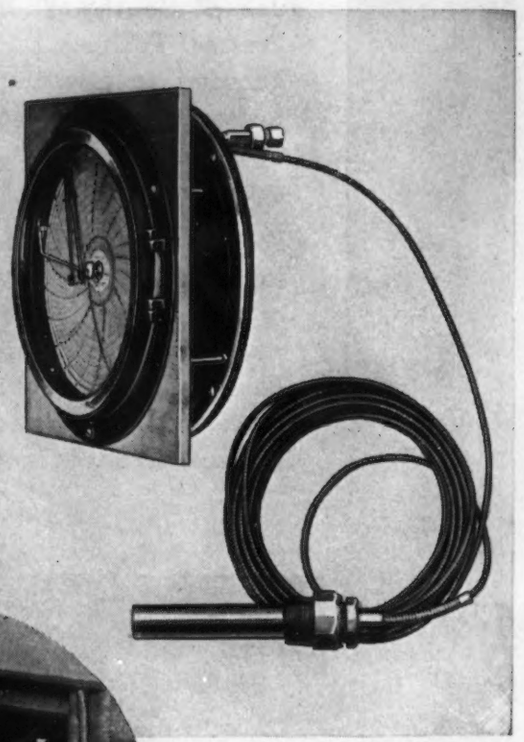
Pacific Coast Representative: THE PELTON WATER WHEEL CO., San Francisco

The safest connector between two moving parts!

•

American Flexible Metal Hose & Tubing

One instance of how American Flexible Metal Tubing is used in product design. Protecting Capillary Tubes on recording instruments.

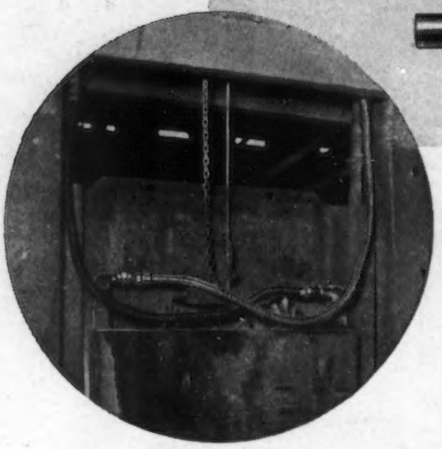


As Standard Equipment

Incorporating American Flexible Metal Hose and Tubing as original parts on your product is excellent insurance against the need for future servicing. In any case where a flexible connector or conductor is needed to take up movement of parts or where vibration threatens to crack rigid pipe, American Flexible Metal Hose and Tubing will answer. For carrying air, oil, water, steam, or fuels of various kinds, "American" has 30 years successful experience to recommend it. Your customer recognizes "American" as a *quality-mark;* hence it has a definite sales value to you.

In Maintenance Work

American Metal Hose is used in hundreds of applications to save time, to avoid shut down of machinery, to cut costs. Steam, air, oil, water, cutting compounds, dust, chips, smoke and other materials can be successfully conveyed through American Flexible Metal Tubing. No need to make expensive pipe bends when "American" is used because it is *flexible* and yet it can be safely used under high pressures and temperatures. "American" is ANALL-METAL; hence it lasts longer. *Write us in detail about your problem. Our Engineering Service is available without cost.*



ANACONDA
from mine to consumer

Left . . . In maintenance, too, American Metal Hose is widely used. Open hearth furnace door cooling demands rugged, flexible metal hose of unquestionable quality.

Send for Bulletin SS-3. Just off the press and packed with valuable information for your engineering department. 37496

THE AMERICAN BRASS COMPANY

American Metal Hose Branch

General Offices: WATERBURY, CONNECTICUT

PRIME YIELD IS PROFIT YIELD!

HOW TO ATTAIN a consistently profitable yield from your presses is the main thing the Armco Man thinks about when you call him in to talk "cold-rolled." Toward this end he drives with all his resources. He merges your broad knowledge, his own and his company's in solving your individual problem.

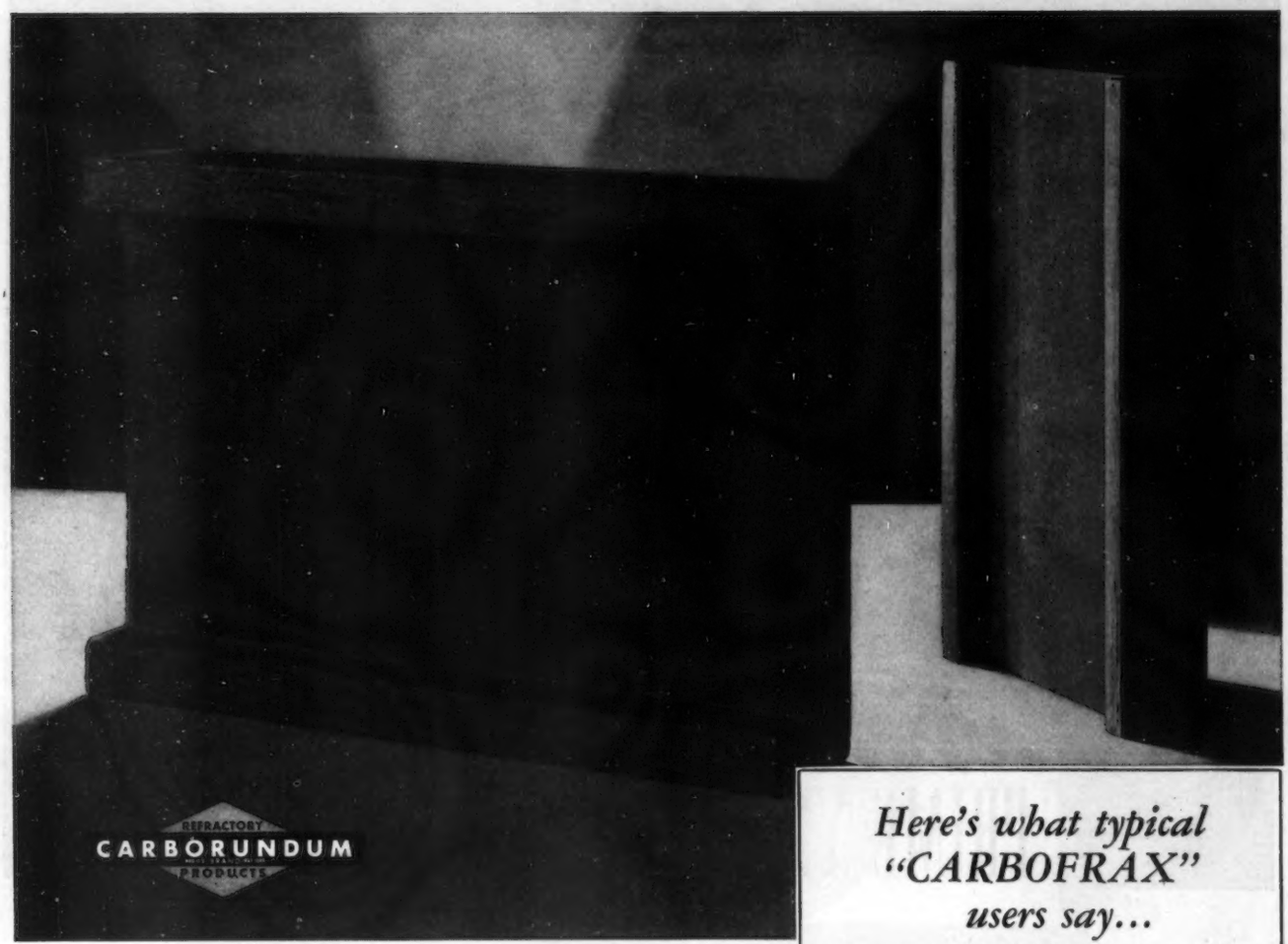
This is why you'll find Armco Cold-Rolled Sheets and Strip giving top results in hundreds of stamping plants—why prime yield (profit yield) hits new highs and holds them—why production costs dwindle and quality is steadfastly maintained.

Order your cold-rolled sheets from Armco's modern continuous mills. Or strip in coils or cut lengths. You'll approve their fine finish, uniform analysis and temper and, best of all, their ability to deliver the goods. The American Rolling Mill Company, Executive Offices: 620 Curtis Street, Middletown, Ohio. Offices in all principal cities.

ARMCO

ARMCO *Cold-Rolled Sheets*

The PROOF *of a Hearth is in the* USING



● We could say a lot about the savings that can be made through using "Carbofrax" hearths in your heat treating furnaces . . . savings made possible by the high heat conductivity of "Carbofrax", by its high refractoriness, by its resistance to abrasion. But nothing is so convincing as the experience of actual users. Read at the right what some of them have to say.

Here's what typical "CARBOFRAX" users say...

These extracts from letters of users will give you an idea of what "Carbofrax" can do in your own furnaces.

. . . 'Carbofrax' hearth in annealing furnace has given fuel saving of 25%—"

• • •

. . . 'Carbofrax' hearth has increased production of spring annealing furnace 15% with fuel reduction of 20%. Increase in production due to faster comeback of furnace.

• • •

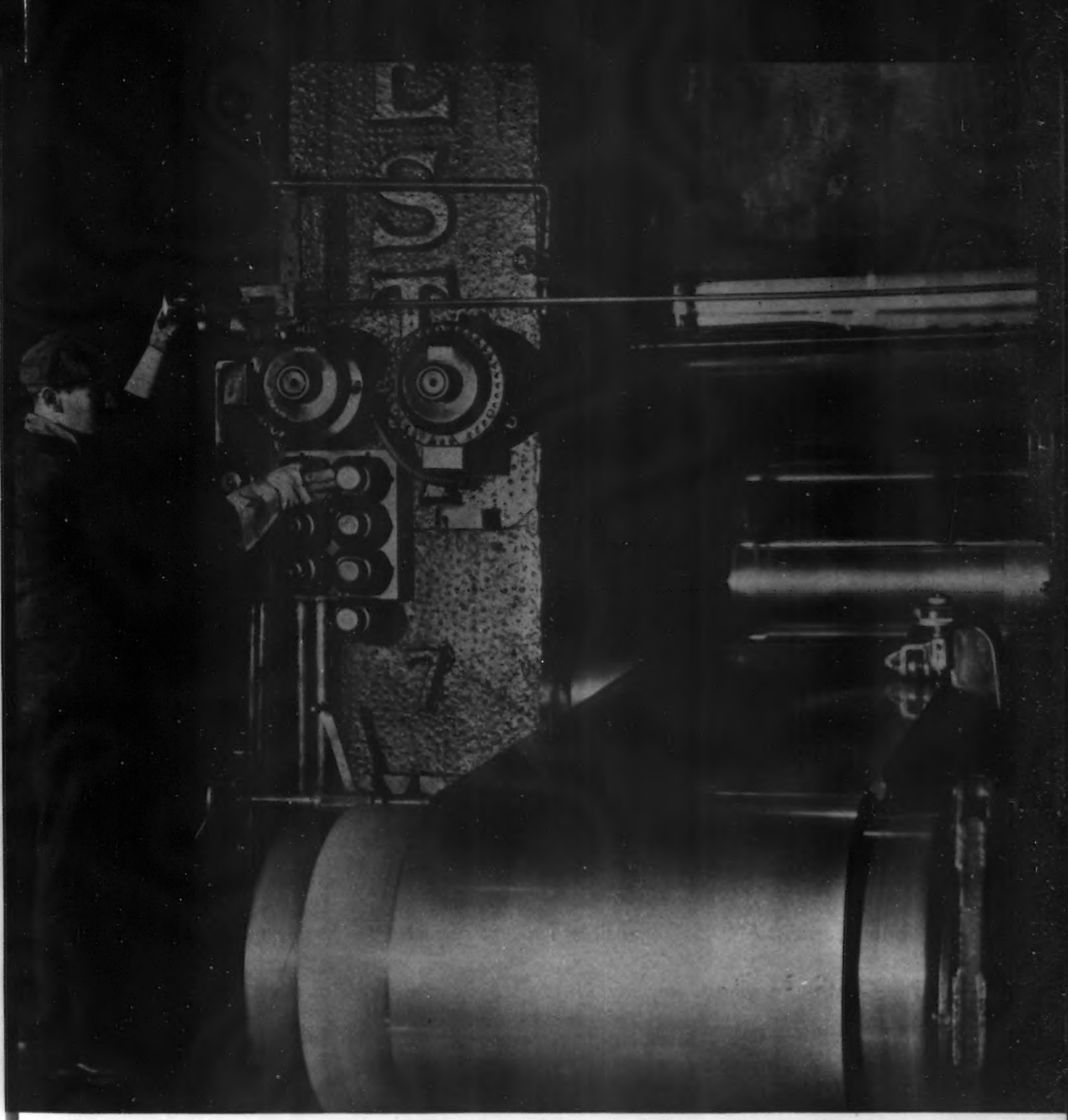
. . . 'Carbofrax' hearth is giving six times the life of fireclay hearth in carburizing furnace. "Carbofrax" does not seem to wear down from constant sliding of boxes."

Our nearest representative can give you further examples of such savings

THE CARBORUNDUM COMPANY, REFRACTORY DIVISION, PERTH AMBOY, N. J.
REG. U. S. PAT. OFF.

Sales Offices and Warehouses in New York, Chicago, Boston, Philadelphia, Cleveland, Detroit, Cincinnati, Pittsburgh, Grand Rapids

(Carborundum, Aloxite and Blastite are registered trade-marks of The Carborundum Company)



You'll Save By Using Inland Sheets

● Today's preference for Inland Cold Rolled Sheets follows from records of smooth, cost-saving production experience in many hundreds of plants. Inland field men and metallurgists are often able to solve difficult problems for manufacturers by determining the exact surface and other characteristics best suited to a given process or finished product.

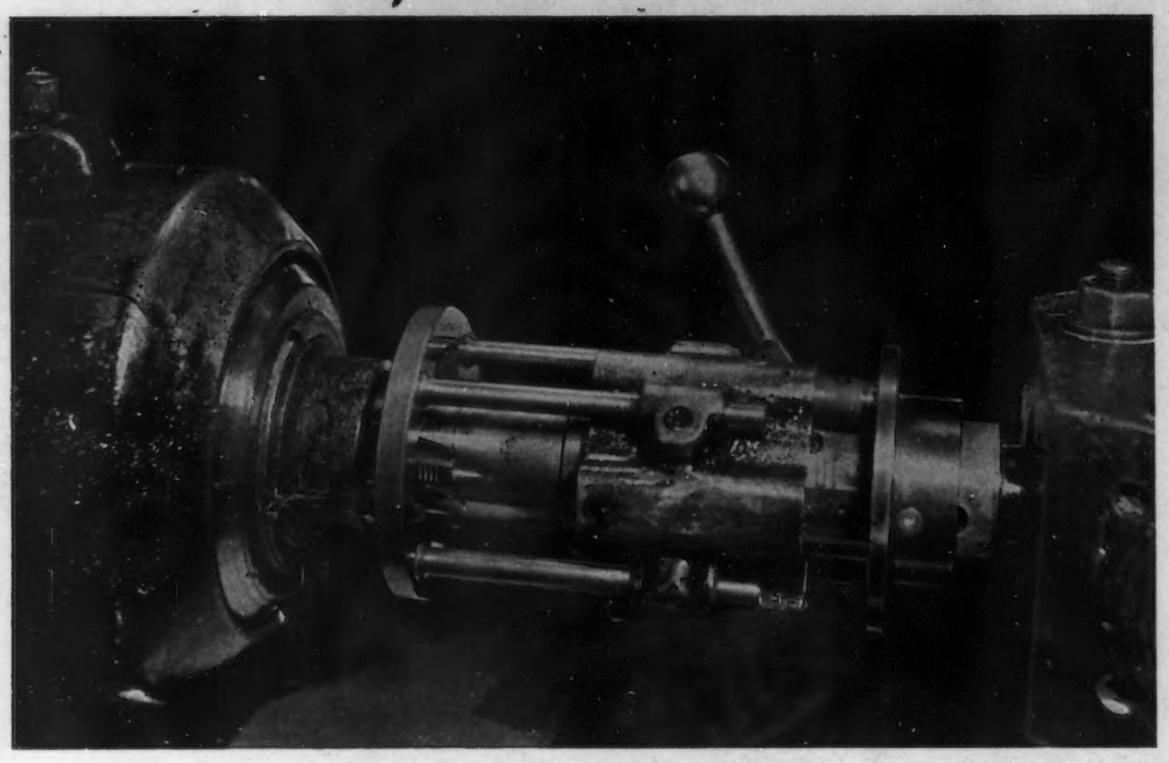
Their co-operation is a regular part of Inland service—personalized to fit the needs of the individual customer.

SHEETS • STRIP • TIN PLATE • BARS • RAILS • REINFORCING BARS • PLATES • FLOOR PLATES • STRUCTURALS • PILING

INLAND STEEL CO.

General Offices: 38 South Dearborn Street, Chicago, Illinois • Offices in: Detroit Kansas City Milwaukee St. Louis St. Paul

Another Cost Cutting Performance Record by LANDIS



Depend upon LANDIS Collapsible Taps to reduce your threading costs.

The Central Forging Company, Catawissa, Penna., depends upon a LANDIS 2" Style LM Receding Chaser Tap, illustrated above, to cut their threading cost of Union Heads to *one-third* of the cost by previous methods.

This Tap completes a 2" Standard pipe thread in 15 seconds, permitting a total production of 55 pieces per hour. An average of 2000 pieces are tapped between grinds of the chasers.

Use LANDIS Taps for cost cutting performance.

LANDIS MACHINE COMPANY, Inc.

Tap Division

Waynesboro, Penna.

FRITZ J. FRANK
President
J. H. VAN DEVENTER
Editor

C. E. WRIGHT
Managing Editor
A. I. FINDLEY
Editor Emeritus

R. E. MILLER
Machinery Editor
F. J. WINTERS
Art Editor
T. W. LIPPERT
Metallurgical Editor

Associate Editors
F. J. OLIVER
G. RICCIARDI
F. JURASCHEK
Consulting Editor

Washington Editor
L. W. MOFFETT

Resident District Editors
T. C. CAMPBELL
Pittsburgh
ROBERT G. BINGHAM
Chicago
F. L. PRENTISS
Cleveland
W. F. SHERMAN
Detroit

Editorial Correspondents
F. B. RICE-OXLEY
London, England
ROBERT G. McINTOSH
Cincinnati
G. FRAZAR
Boston
P. FIDRMUC
Hamburg, Germany
L. E. MEYER
Milwaukee
LOREN G. IRWIN
San Francisco
F. SANDERSON
Toronto, Ontario
ASA ROUNTREE, JR.
Birmingham
LEROY W. ALLISON
Newark, N. J.
ROY M. EDMONDS
St. Louis
F. T. TURNER
Buffalo

★

Owned and Published by

CHILTON COMPANY
(Incorporated)

Publication Offices
Chestnut and 56th Sts.,
Philadelphia, Pa.

Editorial and Executive Offices
239 West 39th St.,
New York, N. Y.

OFFICERS AND DIRECTORS
C. A. MUSSELMAN, President
FRITZ J. FRANK, Executive Vice-President
FREDERIC C. STEVENS, Vice-President
JOSEPH S. HILDRETH, "
GEORGE H. GRIFFITHS, "
EVERIT B. TERHUNE, "
ERNEST C. HASTINGS, "
WILLIAM A. BARBER, Treasurer
JOHN BLAIR MOFFETT, Secretary
JOHN H. VAN DEVENTER
JULIAN CHASE
THOMAS L. KANE
CHARLES S. BAUR
G. CARROLL BUZBY
P. M. FAHRENDORF

★

C. S. BAUR, *General Advertising Manager*
A. H. DIX, *Manager Reader Service*

Member, Audit Bureau of Circulations
Member, Associated Business Papers
Indexed in the Industrial Arts Index.
Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50; Foreign, $12.00 a year. Single copy, 25 cents. Cable Address, "Ironage, N. Y."

ADVERTISING STAFF
Emerson Findley, 621 Union Bldg., Cleveland
B. L. Herman, Chilton Bldg., Chestnut & 56th Sts., Philadelphia, Pa.
H. K. Hottenstein, 802 Otis Bldg., Chicago
H. E. Leonard, 239 W. 39th St., New York
Peirce Lewis, 7310 Woodward Ave., Detroit
C. H. Ober, 239 W. 39th St., New York
W. B. Robinson, 428 Park Bldg., Pittsburgh
D. C. Warren, P. O. Box 81, Hartford, Conn.

THE IRON AGE

Contents

AUGUST 26, 1937

A New Rule Every 40 Minutes 27
Labor Negotiations in a Gold Fish Bowl 28
Classification of Machine Power Transmission Equipment 33
Metal Finishing Economics—Silver Plating 38
Steel Ingot and Finished Steel Capacity 44
Pig Iron Capacity of the United States 45
Studies of Casting Stresses in Chilled Iron Rolls 46
Automotive Industry 52
Statistics on Metal-Working Activity 56
Rate of Activity in Capital Goods 57
Washington News 58
NEWS CONTENTS 68
Plant Expansion and Equipment Buying 110

▼ ▼ ▼

Just Between Us Two 119
Products Advertised 119
Index to Advertisers 146

Copyright 1937 by Chilton Company (Inc.)

Glorifying PRODUCTS MADE OF ZINC-COATED WIRE

FOR many years, products made of zinc-coated wire looked fairly well in the store or warehouse, but their good looks did not last. In service they soon lost their lustre, grew dingy, rusted out. They had little claim to either sales appeal or durability.

Then came bethanizing. Manufacturers were quick to realize that this unique electrical method of applying zinc to wire does two important things for them. First it materially improves appearance and sales appeal. Bedsprings, bicycle seat springs, clothesline, tricycle wheel spokes, farm fence and scores of other products made of bethanized wire gleam like polished silver—and keep right on gleaming indefinitely.

And the better looks are backed up with solid values. The extreme purity, uniformity, ductility, tightness of bond and the extra weight of the bethanized coating increase both durability and the range of products that can be made of zinc-coated wire. Now, chain-link fence can be made of wire zinc-coated before fabrication. Wire-mesh conveyor belts can be woven of zinc-coated wire instead of more costly materials. Strand is made more resistant to industrial atmosphere.

If you use wire in any form, if you are interested in improving the appearance and increasing the durability of your product, you will find it worth while to investigate the possibilities in bethanized wire.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

▲ ▲ ▲ THE IRON AGE ▲ ▲ ▲

August 26, 1937

ESTABLISHED 1855 Vol. 140, No. 9

A New Rule Every 40 Minutes

PSYCHOLOGISTS tell us that the child is to be pitied who is inflicted with nervous relatives. You know the kind—father and mother, aunts, grandparents and what have you who are continually saying "don't!" If the victim arrives at maturity without becoming an anarchist, a psychopathic case, a professional social reformer or a nervous wreck, he or she is likely at best to spend the rest of life avoiding policemen and dodging imaginary brickbats.

If a child who suffers from too much personal management is to be pitied, what about the present-day business man? Think of the bombardment of don't's and do's that he is undergoing in these days of the New Delirium.

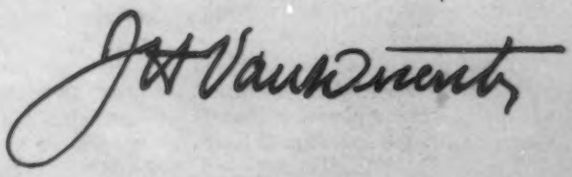
The President and the Cabinet have been working overtime to think up harsh names to call him; Congress has passed or has in contemplation all sorts of laws to regulate him; the N.L.R.B. has set out to prosecute and persecute him; John Lewis is making horrible faces at him; William Green is sticking his tongue out at him; Senator Wagner is boosting his costs and Secretary Morgenthau is sending the tax collector to grab his profits.

But that is only the beginning. We are overlooking the 39 Federal agencies, of alphabetical designation, each of which is making rules which have the force of law. And these 39 agencies are turning out new rules to regulate and regiment the employer and business man at the rate of one every 40 minutes of each working day!

Hard to believe, isn't it? Let me quote from "An Important Notice to All Employers" issued by the National Archives of the United States, a division of the Federal Register. This official publication of the United States Government urges the employer to subscribe at a cost of $10 per year so that by perusing its monthly he may keep up-to-date on the official do's and don't's. As a reason why he should, the circular states that "Thirty-nine Federal agencies, for the period from March 12, 1936, through May 13, 1937, filed with the division (of the Federal Register) 4802 documents having general applicability and legal effect. This material forms the body of the current Federal administrative law."

Four thousand eight hundred and two do's and don't's, having the force of law, launched at business in a period of 16 months! On the basis of 26 working days per month, do's and don't's (or suffer the consequences) are coming from Washington at the rate of 13.2 per 8-hr. day, **or one every 40 minutes.** Can you beat this outside of Alice in Wonderland or even tie it in an insane **asylum?**

If the American business man survives the mass production of do's and don't's of the New Deal, he is likely to dodge policemen and duck imaginary bricks the rest of his life. And when he gets to Heaven he will instinctively ask St. Peter for the book of rules.



They Put Labor Negotiations In a "Gold Fish Bowl"

By FRED DE ARMOND

SOMEWHERE in his voluminous works Walter Pitkin has said that writing consumes a certain amount of mental energy, public speaking somewhat more, and directly dealing with people most of all. Assuming that this appraisal is correct, one might point to another activity which demands more mental energy than either of these, because it combines all three. That is labor negotiation —an activity very much to the fore just now.

Business executives on the whole have shown a notable ineptitude in this direction. Unaccustomed to meeting their employees in this role and unfamiliar with the strategy of professional labor leaders experienced in "strike diplomacy," they have blundered sadly. Victory after victory has been added to the union scalp belt because industrialists have given way where they should have stood pat and punched when they should have ducked. And so they go on placing themselves in a bad light by doing under duress what they might have done voluntarily, or what need not have been done at all if the same degree of intelligence that goes into merchandising or production had been brought to bear on labor relations.

Of course, this requires tact and high concentration of the faculties, not unlike the diplomacy that is exercised around the council board of nations. Imagination goes back to the great Hall of Mirrors in Versailles where Woodrow Wilson was out-maneuvered by Lloyd George and Clemenceau, both men with mental powers inferior to his; or to the victory of Charles Francis Adams in the Joint High Commission that decided the Alabama Claims. Then there was the astonishing open strategy by which Charles Evans Hughes upset the Old World diplomats at the Washington Disarmament Conference.

The officers of the Caterpillar Tractor Company of Peoria, Ill., recently demonstrated industrial diplomacy of a high order during the labor disturbances at their plants. So well did they handle the matter that an account of it should be highly suggestive for others who may be facing the same music. It has been said that there are three ways of getting out of a scrape—push out, back out or keep out. Caterpillar pushed out, successfully.

B. C. Heacock, president of the Caterpillar Company, and his associates accepted the Wagner Act as a mandatory order to bargain collectively with any and all groups of employees, either directly or through representatives that they might designate. But how to bargain with various groups and not play favorites nor discriminate against those employees who did not choose to join any union was the precise problem they sought to solve.

Previously they had tried earnestly to give every worker a square deal, but never had signed any contracts. When C. I. O. organizers came in with the usual set of demands Mr. Holt, the executive vice-president, agreed without hesitation to a bargaining conference. But, much to the surprise of the C. I. O. men, this was very different from the usual such affairs. When representatives of management and the Amalgamated Association of Iron, Steel and Tin Workers met at the appointed time approximately 100 employees representing every department of the big Peoria plant were present, as well as business agents of the several A. F. of L. craft unions with Caterpillar members. Several gentlemen of the press were on hand, also an expert court reporter. All the proceedings of this and succeeding conferences were recorded, published in booklets and distributed promptly to all employees.

Addressing himself strictly to the union representatives, Mr. Heacock opened the conference with a speech which in reality was directed at all workers of the company. He pointed out in simple but forceful language that the customers—the buyers of tractors—were their bosses, that nobody can force a customer to buy, and that "too little production and too high

wages are bound to produce another depression." Then he read telegrams from the agents of several A. F. of L. unions objecting strongly to any contract which would grant sole bargaining rights to the C. I. O. union.

Three conferences were held under these same conditions. Following the second meeting the management put into writing its policies toward all employees. By thus dealing openly and under the full glare of publicity they were, in effect, bargaining with all other interested unions and with non-union employees who did not choose to have any agent represent them.

In the meantime a sit-down strike by C. I. O. adherents had closed the Peoria plant. On the second day of the strike there was a mass meeting of Caterpillar employees at which a vote was taken on the question of returning to work. A local minister and a citizens' committee supervised the balloting, which resulted in 5,151 votes out of 5,500 for going to work. When they saw how the wind was blowing, the C. I. O. leaders, to save their faces, hastened to ask permission to sign the company's statement of employment policies, which in reality promised nothing that they had not been doing prior to this formality. Next morning the plant re-opened peacefully.

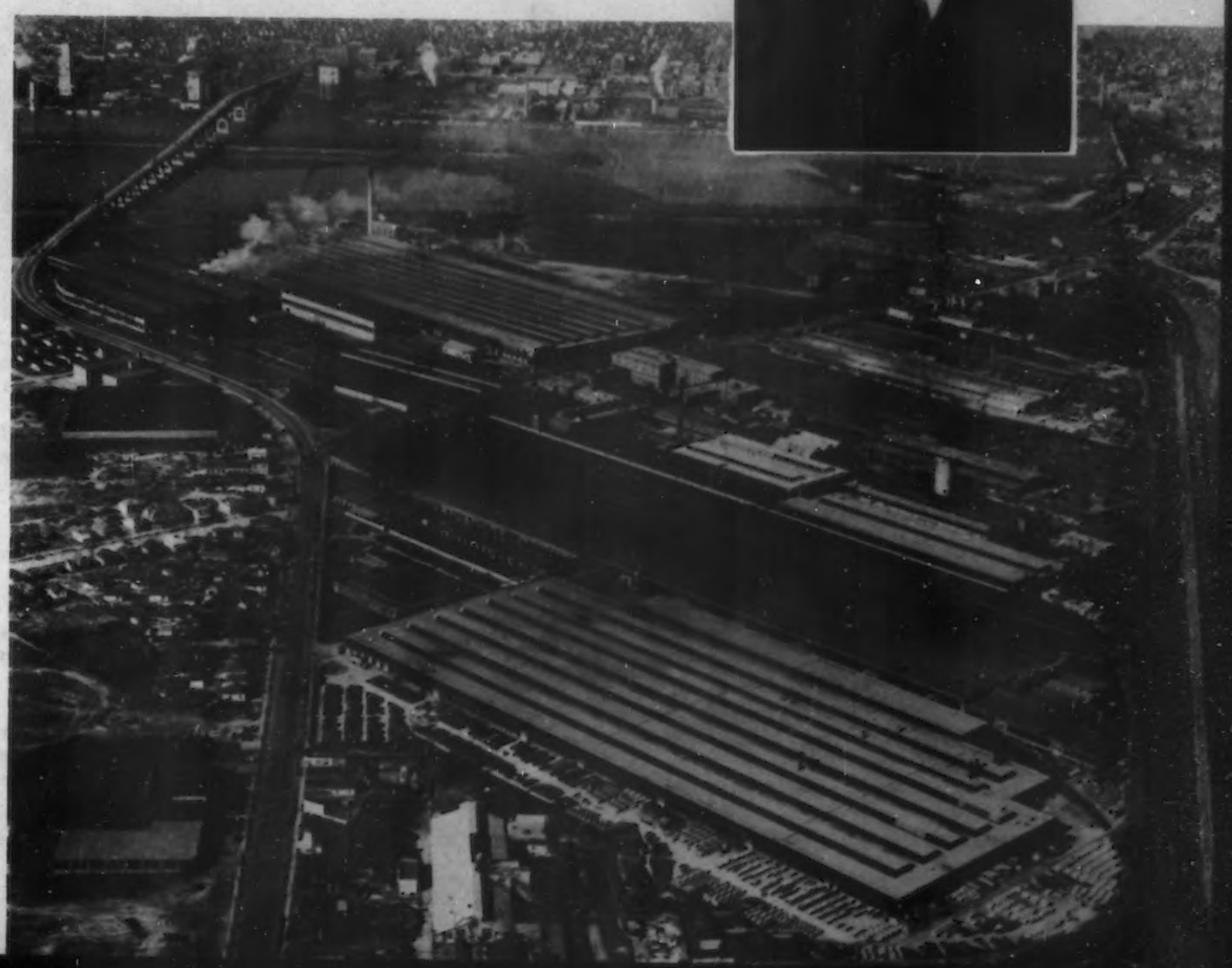
Later Mr. Heacock went to San Leandro, Calif., and there negotiated substantially the same terms with the Machinists' A. F. of L. union. Practically the only difference was that to satisfy the pride of the union chiefs they were permitted to have a hand in rephrasing the agreement. In the published transcript of this conference occurs this passage between Mr. Heacock and Mr. Huybrecht of the union.

Mr. Huybrecht: They (the men) think it is a nice policy you have laid down. They feel, however, that they had nothing to do with the making of it; that there were certain things in . . . . . our agreement that should be added to it, or some of yours taken out of it and some of ours added.

Mr. Heacock: You have indicated that the membership didn't like our contract. As I understand it, the fault lay in the fact that we had written

o o o

B. C. HEACOCK, president, Caterpillar Tractor Co., Peoria, and a birds-eye view of the plant. Mr. Heacock introduced the "gold fish bowl" idea into labor negotiations.



THE C.I.O. starts the ball rolling. Here is the committee which called on the Caterpillar management. Third from right is the district organizer and man on extreme left is a mine-workers' leader who gave advice and counsel.

o o o

BEFORE negotiations in the "gold fish bowl" had more than begun, a small C.I.O. minority pulled a "sit-down". Loyal workers flocked to the office to ask what to do. "No violence, boys," said President Heacock (indicated by arrow).

o o o

it, and they hadn't, but otherwise it was a good contract.

The strategy used in handling these negotiations is well worth detailed study by business executives. In the first conference at Peoria Mr. Heacock went on record to the effect that his company could not share management responsibility and authority. The viewpoint of employees and their agents would be given consideration at any time, but they could not obligate themselves in advance to accept it. In case of disagreement they could not abdicate in favor of any "impartial arbitrator." He reminded the labor spokesmen that we already have in our courts impartial umpires to decide between two interpretations of a contract.

Remembering that he was speaking to all his employees and the public as well, the Caterpillar president recalled that originally he had been a bookkeeper for his company; that he remembered Mr. Connor, one of the vice-presidents, as foreman of a little tool room; that the general factory manager had been a machine shop foreman; and that other members of the executive personnel had come up from apprentices or other lowly jobs.

After the union's proposed contract had been discussed the company representatives asked for and were granted some two weeks to consider it. Sometimes in labor controversies it is not possible to get this much time, but it would seem wise in most cases to ask for it at least.

At the second conference Mr. Holt, speaking for the company, sprang something different in labor diplomacy. He explained that before the negotiation proceeded further the company felt it should have certain information about the union—facts in which all of its employees would be interested. He then submitted a number of questions, including the following:

Who is the Steel Workers Organizing Committee? Has it been duly authorized to represent the Amalgamated Association?

Has the Amalgamated Association any by-laws and constitution? May we have a copy

of them? Is there any way of knowing whether the "successor" (mentioned in the contract) to Amalgamated will have the same or an entirely different set of by-laws?

How much dues and initiation fees do you contemplate collecting from our employees? Will there be a different initiation fee for members who join later?

When it came to taking up clause by clause the substitute agreement offered by the company as a codification of its whole attitude and policy toward all employees, much patience combined with firmness was required. Of course, the union conferees wanted to incorporate specific items such as a restriction on the number of apprentices and a provision that men who worked a certain shift should have their free 48 hours a week in one unbroken period or else draw extra pay. On all such points the attitude of the management was to keep the terms broad and general —confined to principles and the machinery of bargaining in such a way that all workmen who have grievances may be sure of receiving attention from management.

The union representative who brought up the matter of a continuous 48-hour rest period was rather persistent, and the disposition of this point has some interest as a bit of negotiation. It was handled by the representative of State Labor Department, Mr. Vincent, who asked of the chairman: "Will not the transcribed minutes of this meeting go into the construction of the contract, if it is negotiated?"

After having been assured that it would, the union member conceded this demand with the remark that Mr. Vincent's point has put

THEN the loyal employees arranged a mass meeting at the State armory and a "back-to-work" election under the jurisdiction of a citizens' committee. Out of 5,500 eligibles, 5,151 voted to return.

o o o

o o o SO the Caterpillar boys marched back to work after what they called a "forced vacation" of two days.

o o o

him at ease, since the minutes would show he had carried out the instructions of those who had charged him to bring it up in conference.

At one point Mr. Heacock assured all of the 100 employees in attendance at the conferences that they would not lose any pay by reason of the time out, and that if some other hour for succeeding meetings would please them better he would try to arrange it. "It doesn't matter to me," he added, "as my hours are much longer than any of you have." That scarcely could fail to impress workers with the price that management pays for its authority and perquisites.

Nothing about the Caterpillar negotiations is quite so significant as the intelligent use of publicity by the company. Throughout the present upheaval agitators and reformers have captured nearly all the headlines, probably because, as Ortega y Gasset has expressed it, contemporary history is generally regarded as "a history of a people's hours of drama, and not of its daily life; a history of its frenzies and not of its normal pulse; in short, not a history at all, but a headline." But Mr. Heacock and his associates succeeded in making the C. I. O. organizers just goldfish in a bowl. And doubtless these gentlemen themselves will admit that as goldfish they lose some of the terror with which they have cowed industrialists.

LAST act in the gold fish bowl drama was the signing of an agreement confirming the company's labor policies and protecting the majority of independent workers as well as the various union minorities.

"Double Treating" Track and Frog Bolts

THROUGH the years there has been little change, generally, in the methods used in manufacturing heat treated track and frog bolts. The accepted practice consists of the following operations:

(1) Heating for forging.

(2) Hot heading.

(3) Rolling thread while hot.

(4) Time quenching from forging heat (usually in oil).

(5) Drawing with residual heat.

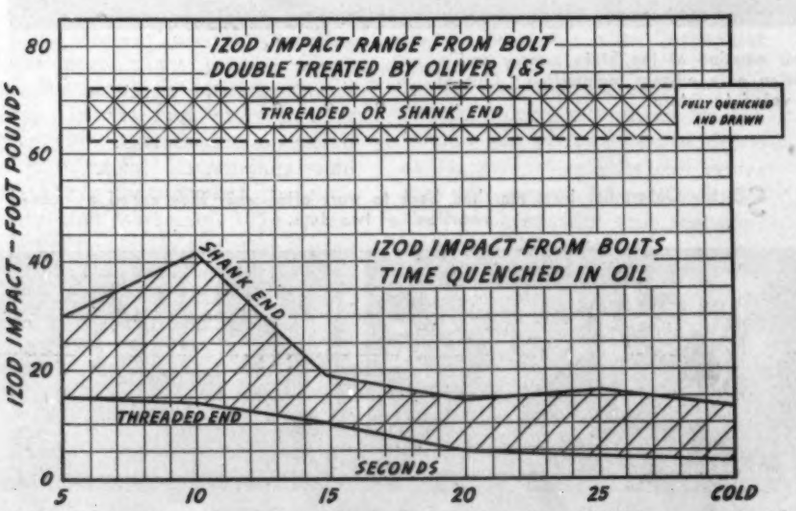


FIG. 1—Chart shows the wide variation in impact values that exists between shank and threaded end of time quenched blots, as compared with "double treated" bolts.

o o o

By CHARLES FASSINGER

Vice-President, Oliver Iron & Steel Co.

o o o

An analysis of this practice showed that up to the point of quenching, satisfactory conditions prevailed, inasmuch as a full quench could be consistently secured. This fact indicated that the temperature losses incident to the early operations, and prior to the quench, were not sufficient to lower the temperature of the bolt under that necessary to produce a satisfactory hardened state.

The practice of time quenching involves an exactly controlled period of time in the quenching bath in order to retain the correct amount of heat necessary for a partial quench that will produce a given measure of ductility. Obviously the usual practices (as noted above) do not permit the exact control of temperatures at the time of entry into the bath, and therefore there must occur a variable in the residual heat con-

(CONTINUED ON PAGE 81)

Simple Classification of Mechanical Power Transmission Equipment

o o o

By FRANCIS JURASCHEK
Consulting Editor, The Iron Age

o o o

CHAPTER 18 of a comprehensive series on the Economics of Industrial Power Transmission.

o o o

SO far in this series of discussions, seven articles have been devoted to the fundamental economics of industrial power transmission systems, and ten articles to the purely electrical phases of such systems. Twenty or more articles will now be devoted to the descriptions and applications of the mechanical phases of industrial power transmission.

In tracing this subject logically from the source of power to the actual use of the power by the machine, it will be necessary to shift slightly the angle of approach hitherto maintained, and to make two assumptions. The first assumption is that the advantages and disadvantages, for any given situation, of the various *systems* of industrial power transmission have been carefully studied in relation to the production problems of the plant, and that the proper and economic selection of the system to be used has been made. The second assumption is that the electrical factors involved in the system selected have likewise been carefully considered; the distribution

A POSITIVE, direct-coupled drive. A Lincoln motor driving one of the ventilating fans in the East Boston traffic tunnel.

of current planned to the best advantage, the best type and size of motor determined for each drive, and the related questions of control worked out in detail. The problem then reaches the point of determining what the connection shall be between the motor shaft and the machine spindle.

This problem is concerned solely with the mechanical phases of power transmission equipment. It is in this field that many of the worst examples of faulty application and use of industrial power are still to be found. Rule-of-thumb methods have been and are used so frequently in the matter of the selection of types and sizes of mechanical power transmission equipment that intelligent and conscientious power use surveys reveal daily scores of points where minor equipment changes will save many production dollars.

There are two reasons for this. The first is due to the fact that practically no item of mechanical power transmission equipment can be selected on a strictly scientific basis. Most formulas for application are empirical; that is, they are deduced from observation and experience. Conditions of use vary so much that it is impossible to formulate hard and fast rules. For instance, a friction clutch is never installed on a shaft to transmit exactly the power desired in the driven member. Experience says that it should have a rating at least 25 per cent greater for safety because of the inertia to be overcome in starting the driven load. Now, 25 per cent over-rating may be excessive for many operating conditions, and much too low for others. Rule-of-thumb calculations creep in when doctors disagree. Yet it is not a difficult matter to test the load for any given condition, and to come to a decision which is at least not based on guess-work. The second reason lies in the lack of mechanical engineering knowledge which, until recent years, has been the great fault of so many "practical" maintenance and production men in industry. As a consequence, a good many of the older plants in the country still use mechanical power transmission methods and equipment of a Victorian vintage.

There is possibly a third reason. A bewildering array of mechanical transmission equipment is offered the buyer today, all recommended as a panacea. It is confusing even to the initiate to classify this equipment properly as to function, much less to use it all to the best possible advantage. One well-known writer on industrial power transmission subjects advocates a classification based on the terms "rigid" and "flexible," neglecting to allow for the obvious fact that there can be no such thing as a rigid drive. Rigid means "stiff, firm, inflexible," and a stiff, firm, inflexible drive would cause instant damage to either driving or driven mechanisms, or both, as soon as the power was applied. One is reminded of the ancient class-room problem of the irresistible force meeting an immovable body; to which the only answer is—catastrophe. Realizing that fact, a majority of the couplings made today (classified in the system in question as "rigid") are purposely designed to be, and are called, "flexible." Again, in that system of classification, chain drives are called flexible, and placed in the same category with belt drives, of which the dominant flexible characteristics are due to slip and the elasticity of the material—both being qualities certainly not to be found in chain drives.

Another confusion of ideas found in that same system of classification lies in the naming of modern group drives, whether using chain or belts, as flexible methods. But modern group drive is not merely a mechanical drive method, any more than is individual motor drive. Both are *systems* of power application, in which the electrical equipment plays as large a role as the mechanical equipment used. In fact, most of the economic advantages claimed for modern group drive may be traced directly back to improved motor operation and lower electrical costs. Both modern group and individual motor drives *must* be considered today as unit problems, all the way from the meter to the machine. Neither can be effectively considered from the mechanical or the electrical angles alone.

Logical Classification

The real importance of a logical classification of mechanical power transmission equipment lies in the fact that, if it is correctly made, it immediately differentiates between the types of machine loads encountered, and thus furnishes at least a partial clue as to proper application. Approaching the classification of equipment then by way of the even more fundamental classification of loads, it is found that all loads may be simply grouped in two basic types. One type is the steady, uniform load, or the load which varies slowly and may be regarded as steady during brief periods. This type of load may be found in centrifugal pumps and fans, conveyers, wire-drawing machines, cement kilns, mixers, etc. In some of these drives the starting torque is very high; but, once, in operation, the machine load is quite steady and the flow of power smooth. The other type of load is either pulsating in character, or, while normally steady, is subject to sudden shock effects which impose sharp stresses on the driving mechanism over and above the normal torque effort. Such loads are found in compressors, in punching and forming presses, in machine tools with a reciprocating motion such as planers and broaches, in shears, in crushers, in stamping mills, in weaving looms, in flat-bed printing presses, etc. In all these machines the load varies from a low point to a high point, sometimes regularly and sometimes according to no known time-cycle. For most work of this character a portion of the driving energy is stored up in a flywheel during the low-load period in order to permit the machine to meet successfully the high-load moments. The slower the succession of high-load periods, or impact-blows, the larger and heavier the flywheel; in the case of extremely rapid, light blows, as of the shuttle on a weaving loom, the flywheel effect of the rotor of the motor may be sufficient to insure smooth operation.

The point to be emphasized here is that in the first type of load the smooth, even flow of power is particularly well adapted for a *positive* type of drive; while in the second type of load the recurrent shock stresses require not only the storage-of-energy effect of a flywheel to smooth out the load, but a certain degree of *resiliency* in the drive to absorb such shock as is not completely taken up by the flywheel. It is interesting in this connection to see just what the word "resilient" means as applied to mechanics. The definition is "capable of withstanding sudden shock without permanent deformation or rupture."

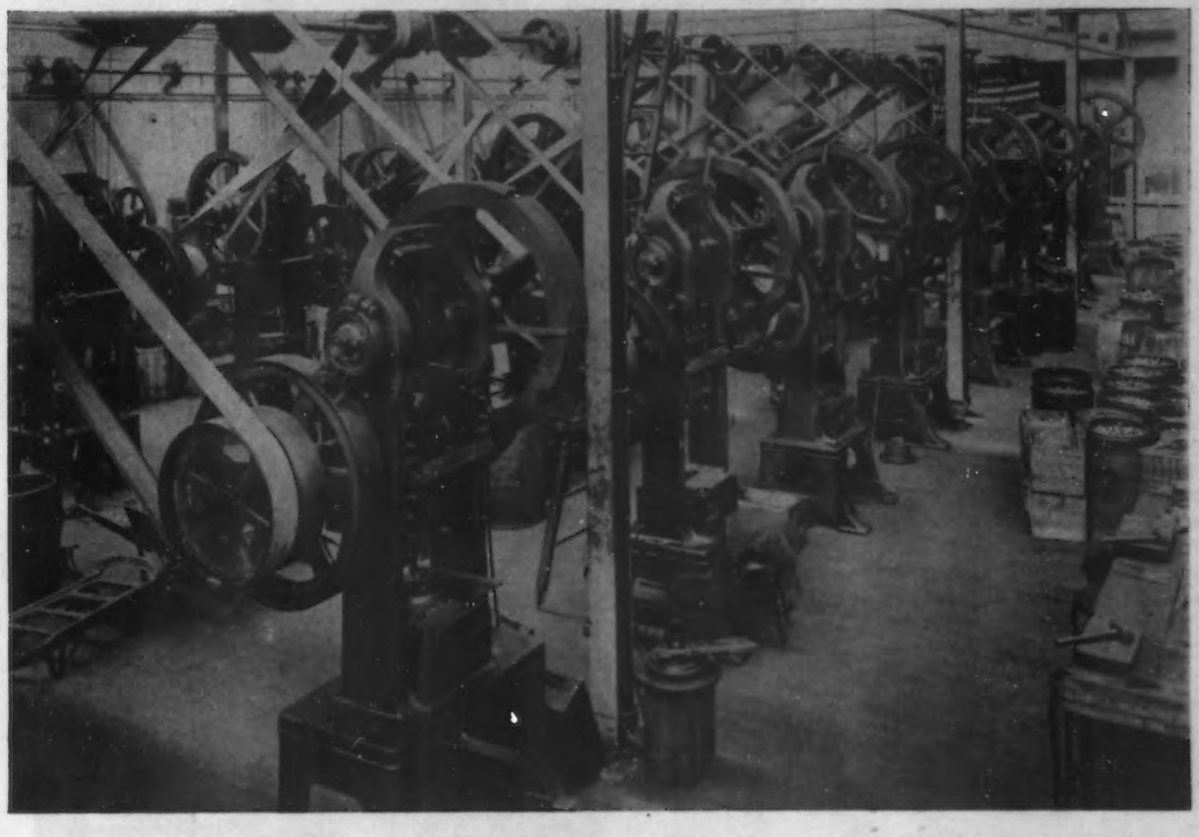
Now, machine loads vary in degree of smoothness or jerkiness. In between the very smooth action of a centrifugal fan and the extremely jerky action of a heavy metal-forming press there are many shades of difference, with one or more machines to be classified as belonging to each shade. And many types of mechanical power transmission equipment are being successfully used to drive machines of practically all types of load characteristics. Nevertheless, all major types of mechanical drive equipment, by virtue of certain inherent characteristics, may be very simply and logically grouped into two main "methods-of-drive" classifications; according as to whether they may be termed "positive" or "resilient." I am therefore suggesting a new method of classification of mechanical drive equipment, depending on the way in which the drive reacts to the load imposed.

This classification is given in detail on the accompanying chart. It dockets every essential item of industrial power transmission equipment, electrical and mechanical, in logical order. This chart will be used as a guide for the next twenty discussions in this series of articles, as it has been used already for the articles which have hitherto dealt with the electrical phases of industrial power transmission.

As an introduction to the mechanical section of this work, a brief explanation of the terms "positive drive" and "resilient drive" is in order.

Positive drives are drives in which the transmission of power is accomplished through the positive contact of relatively unyielding materials, involving minimum slip between members, minimum elastic distortion of materials, and maximum transfer of energy. Included within this classification are direct couplings of all types, gear drives of all types, and chain drives. Drives of the positive type are not suited to shock loads; if shock loads are encountered, a small portion of the shock load is taken up between the members of the coupling, the teeth of meshing gears, or the slack in a chain drive and the clearances between pins and links, but the major portion is transmitted back to the motor, which *must* slip to avoid damage to the machine and the drive.

Resilient drives are drives in which the natural elasticity of materials, or the slip between members, or the tension-adjusting mechanism of the drive, or the compressibility of the power-transmitting medium takes up the major portion of the shock load; reliance being placed upon the resilient qualities of the drive as well as upon the flywheel effect of the machine and motor mechanisms, to absorb the shock momentarily, and to transmit a maximum of the energy thus temporarily stored up, together with the normal driving energy, to the driven shaft after the shock load has passed, without damage to the driving, the power



RESILIENT, flat leather belt drives are ideal for driving batteries of light stamping presses, as shown in this New England electrical fixture factory.

o o o

transmitting, or the driven mechanisms.

Direct coupling calls for two conditions: 1—Driving the machine shaft at the same speed as the motor (or engine) shaft, and 2—Lining the motor (or engine) shaft directly up with the machine shaft.

Wherever possible, an integral base plate should be used; that is, a common base for both motor and machine, or a motor base plate which is part of the machine frame. Otherwise a combination base should be used; that is a motor base plate fastened to the machine frame rigidly, or a motor fastened to the machine by means of flange plates. Flexible-type couplings are to be preferred for the shaft connection. Sometimes it is found desirable to insert a clutch, either of the friction or the magnetic type, between the coupling and the machine mechanism, to permit the machine to be stopped without stopping the motor. Generally this clutch is built into, and made a part of, the machine itself.

Gear drives are used where it is necessary to decrease or increase the speed of the driving mechanism to suit the operating speed of the machine. Gears may be cast metal (iron, steel or non-ferrous metals), cut metal, or molded or cut fibre or plastic material. There are three principal types of reduction gears:

1. Spur-gear units have gears with teeth cut straight across the face, and have the driving and driven shafts in line. They may be assembled as a planetary or as a non-planetary transmission. In the planetary transmission, idler or planetary gears held in a spider keyed to the slow speed shaft mesh simultaneously into an encircling internal gear and the centrally placed high speed pinion. In the non-planetary transmission the idler gears are compound and are fixed so that they do not revolve planet-wise about the central high-speed pinion; the ring gear revolves instead and is keyed to the slow-speed shaft.

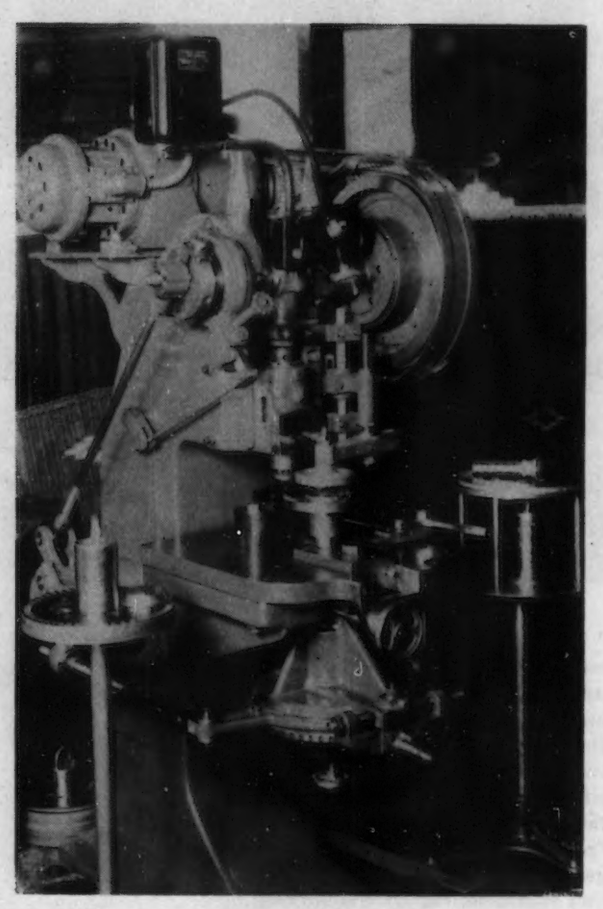
ABOVE

RESILIENCY is provided in unit mechanisms for special machine tools by means of hydraulic or pneumatic transmissions. Here is such a mechanism; an automatic drilling unit driven by a Wagner 3 hp. motor through a combination cam and hydraulic drive.

o o o

AT RIGHT

A RESILIENT drive, made up of a motorized New Departure Transitorq variable speed transmission, Dayton cog-belt connected to the fly-wheel of a V. & O. notching press.



2. Simple worm-gear units are rigt-angled drives; that is, the input shaft lies in a line at 90 degrees from the line of the output shaft. The worm shaft is usually the high-speed shaft. A compound worm-gear permits both input and output shafts to be located along parallel lines.

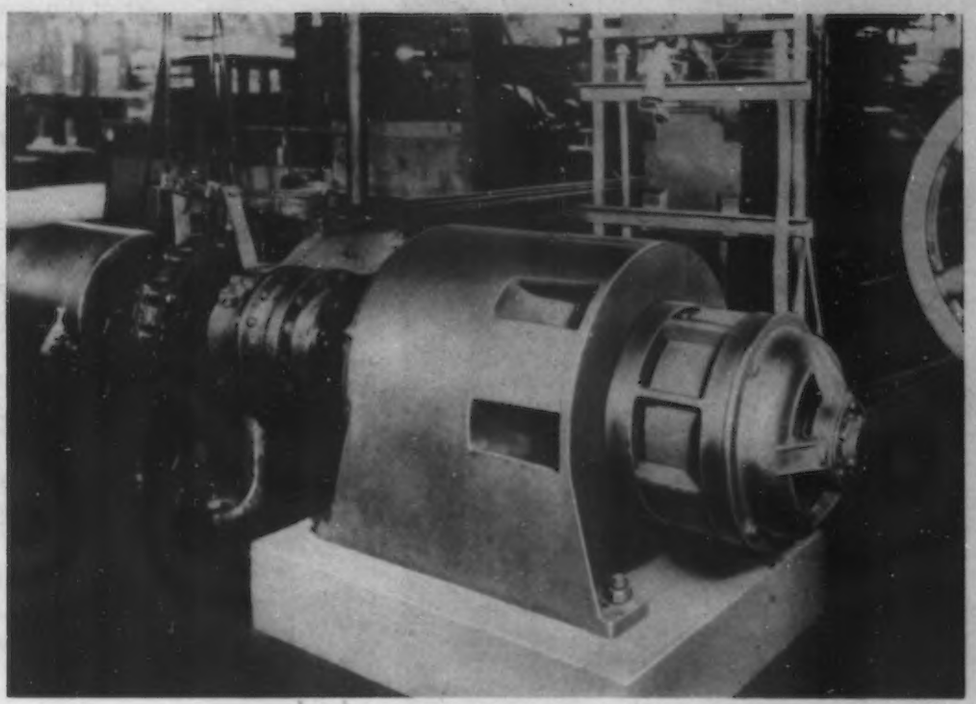
3. Herringbone-gear units have input and output shafts along parallel lines for single and triple reduction, and may have them in line or along parallel lines for double reduction.

Motorized gear units, or gear-motors, may be the combination of any type of gear drive with a motor, mounted integrally in one casing, or the two units fastened together with the motor supported and the gear overhung, or the gear supported and the motor overhung. In any case, the prolongation of the motor shaft is the input shaft of the gear member, usually without the interposition of any coupling. There is, however, at least one so-called motorized gear "unit" available in which a motor and a gear reducer are compactly as-

o o o

A POSITIVE, gear-motored drive. General Electric double-reduction 30 hp. squirrel cage motor-driven copper tube drawbench. Output speed 17 r.p.m.

o o o



sembled, the shafts flexibly coupled, and the motor supported on an extension shelf of the reducer housing.

When it is not desired to reduce or increase the speed of the input shaft, but simply to drive positively "around a corner," bevel or miter gears may be used. These gear types are never used for heavy loads, however, as they cannot be balanced, and the friction load increases rapidly in proportion to the driven load.

Chain drives may be of the roller type, or of the "silent" (inverted tooth) type. The chain is actually a metal belt running over two or more pulleys having sprocket teeth to engage in the links of the chain. Since there is no slip, and since the small amount of play in the chain is due entirely to the take up of the slack side, plus the clearances between each pin and link, and not due to the elasticity of the material, a chain drive must be termed positive. It is flexible as compared to direct couplings or gear drives, but it is not as flexible as any of the resilient drives. In any chain drive the driven shaft must be parallel to the driving shaft; it can never be on the same line except

(CONTINUED ON PAGE 80)

o o o

A POSITIVE, chain-belt drive. Two parallel Diamond roller chains transmit the power from engine shaft to stern paddle-wheel on a Mississippi River steamboat.

o o o

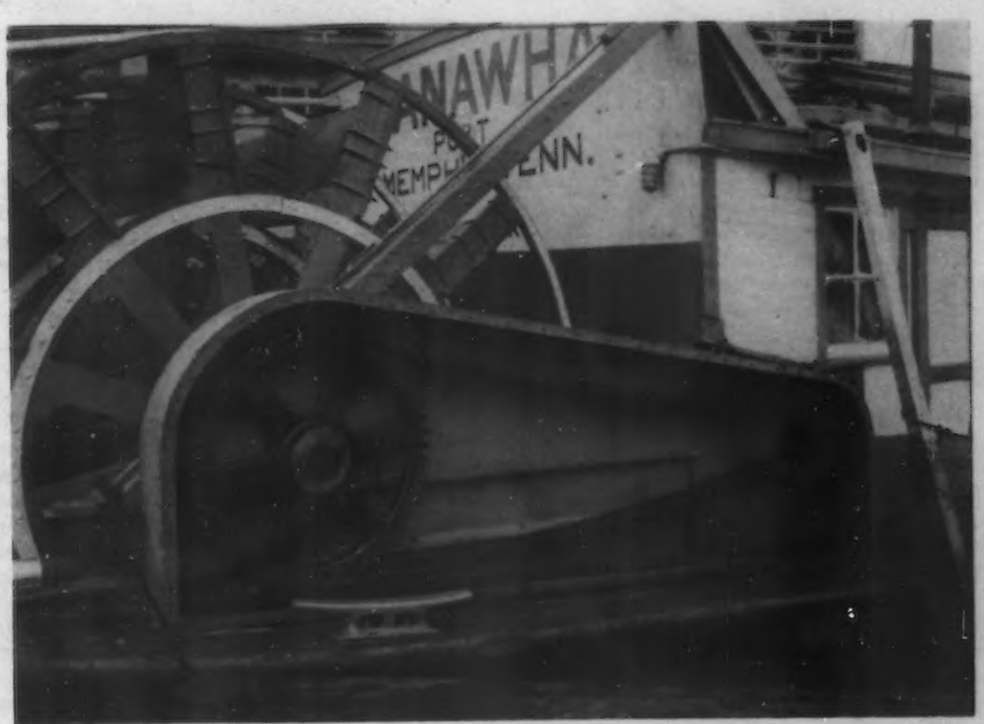


FIG. 1—A French gray finish is applied by immersion in a plating solution of black nickel.

Metal Finishing Economics

Silver Plating

o o o

By HERBERT R. SIMONDS

Vice-President, Metal Products Exhibit, Inc., Rockefeller Center, New York

o o o

RHODIUM, stainless steel, bright aluminum —all have challenged silver as a metal finish. Rhodium is brighter, stainless steel has greater resistance to tarnish and corrosion and aluminum has a more varied surface texture but still the rich, warm quality of silver stands unique and silver plate instead of giving way to the newer finishes seems destined to play an increasing role in the metal finishing realm of the future.

Silver plate is easy to apply and is relatively inexpensive. "It is dependable," said one veteran plater, "and not tricky like chromium." Nevertheless, there are "tricks" in the mastery of silver plating technique, as the description, later in this article, of the practice of the International Silver Co. will indicate.

Silver has an amazing affinity for sulphur and silver sulphides are black, which facts, coupled with the further fact that our industrial life today is full of sulphur means that silver tarnishes readily. To offset this, lacquer manufacturers have made great strides in the development of a fully transparent, flexible and durable lacquer for silver protection. Thus for almost any service except the severe demands made of table ware, lacquered silver plate now affords a durable, decorative and highly practical metal finish.

Silver is so closely associated in the public mind with knives, forks and spoons that this article will be devoted largely to those three items which with a few added items are known in the trade as flatware. Description of some of the many other applications of silver plate will be left for a further article in this series.

The Flatware Industry

Modern life demands the service of an increasing amount of metal. Some have figured the amount used in this country each year at more than a ton per person. The 1937 American is so accustomed to having metal serve him that he can no longer imagine life without it. Except for metal he could not typewrite his letters or dash twenty miles to the beach for a swim, and he certainly would find it awkward at first attempting to eat with chopsticks or wooden spoons. The amount of metal entering into the production of knives, forks and spoons for table service each year is startling. Estimates place the yearly production in this field at about 300,000,000 pieces: the items

themselves being designated by the public as "silverware" no matter what they may be made of.

In the trade the term "flatware" has a definite connotation. It means all knives, forks and spoons used in table service other than carving sets and such obvious exceptions as non-metallic salad sets. Carving knives and some stainless steel knives are classified as cutlery. Deep dishes, vases, bowls, pitchers, candlesticks and other similar items are classified as hollow-ware. Flat platters and most table dishes when made of silver are known also as hollow-ware. If we add to the above classification the term novelties, we then have covered a large percentage of silver and of silver plated products in household use.

Base Metal Alloys

As with most other metal products sold to the public, there are definite style trends in silverware and with recent improvements in quality of silver plating there has been a tremendous swing toward plating from classes of articles formerly inseparably associated with sterling. The term sterling silver still has a certain magic about it and a good demand for the solid metal will probably always continue. For one thing, the United States laws are strict covering the use of the term "sterling" so that the public is about as sure of getting solid silver when it buys a product marked sterling as it is of getting a bona fide bill when it receives a five dollar greenback in change. Under the law nothing can be marked sterling or sterling silver unless it has at least 925/1000 of pure silver. The balance is usually copper. In the case of silver plated articles the situation is entirely different and the customer must rely to a large extent upon the integrity and reputation of the company making or selling the product. Flatware is commonly made of an alloy known as nickel silver, which may vary considerably in composition but which in flatware of repute usually analyzes:

	Per Cent
Nickel	18
Copper	65
Zinc	17

At this point it may be well to review some of the historical background of nickel silver. The Seymour Mfg. Co. in a recent folder traces this alloy back to 235 B.C, where, in Canton, Chinese metal workers made candlesticks and ornamental boxes of a rare white metal which they called packfong, which later proved to be a combination of copper, nickel, and zinc. This or similar alloys appeared from time to time in different places, including Saxony and Sweden, but it remained for the Germans about 1800 to develop it as a commercial alloy. The name German Silver thus attached to the alloy in this country until the late War, when at the request of the government it was changed to "Liberty" silver. Since the War the adoption of the term nickel silver has been general and inasmuch as this term has been used for the past hundred years in England, it probably is here to stay. In 1830 Herr Guitike introduced nickel silver to the Sheffield platers of England and some years later it was adopted as standard in place of copper as the base metal for the famous Sheffield plate. In the plants of the larger manufacturers of silverware, nickel silver is now compounded from the pure metals in electric or oil furnaces where an accurate control of the analysis may be exercised.

Just as silver plated ware has enjoyed making inroads into the sterling trade, so now is stainless steel encroaching on the province of plated flatware. For camps, summer homes, and similar uses stainless steel flatware is becoming increasingly popular, while at the other extreme, gold and gold plated flatware is almost a thing of the past. Even a few years ago the bowls of silver spoons were frequently gold plated, but now that style is losing its popularity.

Much of the silver plating of articles other than flatware is over a base of so-called white metal, which has the following approximate analysis:

	Per cent
Tin	92.5
Antimony	6.0
Copper	1.5

Hollowware which is to be silver plated is frequently made of this white metal or of a similar alloy. Occasionally copper products are silver plated and recently there

SILVER plating, after many ups and downs, now is definitely on the ascendency in the small metal-products industry and its many possibilities as a practical finish should be considered by a more diversified group of manufacturers.

In this second article of a new series on metal finishing by Mr. Simonds some generalities and some practical details of the subject are covered.

The first article of the series appeared in The Iron Age issue of July 29 and dealt with problems of the job plating shop. Subsequent articles will cover nearly all phases of metal finishing with emphasis on the commercial angle.

FIG. 2—This close up gives a good idea of the operation known as sand buffing of spoons described in the text. Photos—Ewing Galloway. o o o

seems to be a style swing in this direction.

The Lure of Silver

Silver has a pleasing, soft, warm, clean appearance. It is difficult to put one's finger on just the quality of silver which gives it so universal an appeal. Someone has said "Use only beautifies and softens its surface or 'patina,' which becomes more gleaming and more richly silver-gray with time." Rhodium is frequently applied over silver and such a finish has its definite place in the case of reflectors and other highly polished exposed surfaces. But rhodium is more brittle and always has a "harder" appearance. Electro-deposited silver has a fine grain and may be polished to high brilliance.

Because silver tarnishes readily in the presence of sulphur, companies like the International Silver Co. go to great pains to see that no sulphur comes in contact with their finished products. Paper used for wrapping silver articles is bought on strict specifications as to the amount of sulphur, and even glue used in making boxes and containers is purchased with the lowest possible sulphur content.

Method of Manufacture

At the plant of the International Silver Co. the nickel silver from electric and from crucible furnaces is cast into slabs of about 80 lb. each. These are sent to the rolling mill, where surfaces are scraped to remove oxides and other impurities, after which the clean slabs are rolled to the proper size through a sequence of reducing operations alternating with annealing. The final strip known as flatware strip stock is made in different widths and thicknesses, depending upon the articles which are to be made from it. Thus ordinary teaspoon stock might be six inches wide and ⅛ in. thick and might be supplied either in coils or in eight ft. lengths.

The rate of production of strip is carefully synchronized with the production of flatware so as to reduce the time which it must be kept in storage. From the rolling mill the strip, as required, is delivered to the flatware production department, where for the production of teaspoons it goes through the following series of fabricating operations: blanking, cross-rolling, grade-rolling, cutting-out, annealing, pickling, bowling on drop hammer, and stamping handle, also on drop hammer. At this point, the spoons have their final shape but have a ragged edge left from the drop hammer operation, which edge is removed in the finishing department, where follows a further sequence. First is the trimming around the edges on emery belts, the belt traveling away from the operator. Next, follow two polishing operations, also on belts, and known as facing and rolling. These are hand operations calling for much skill and experience. The inside of the bowl is polished on small rag wheels. A final polish of the edges known as edging is performed on small belts with the top

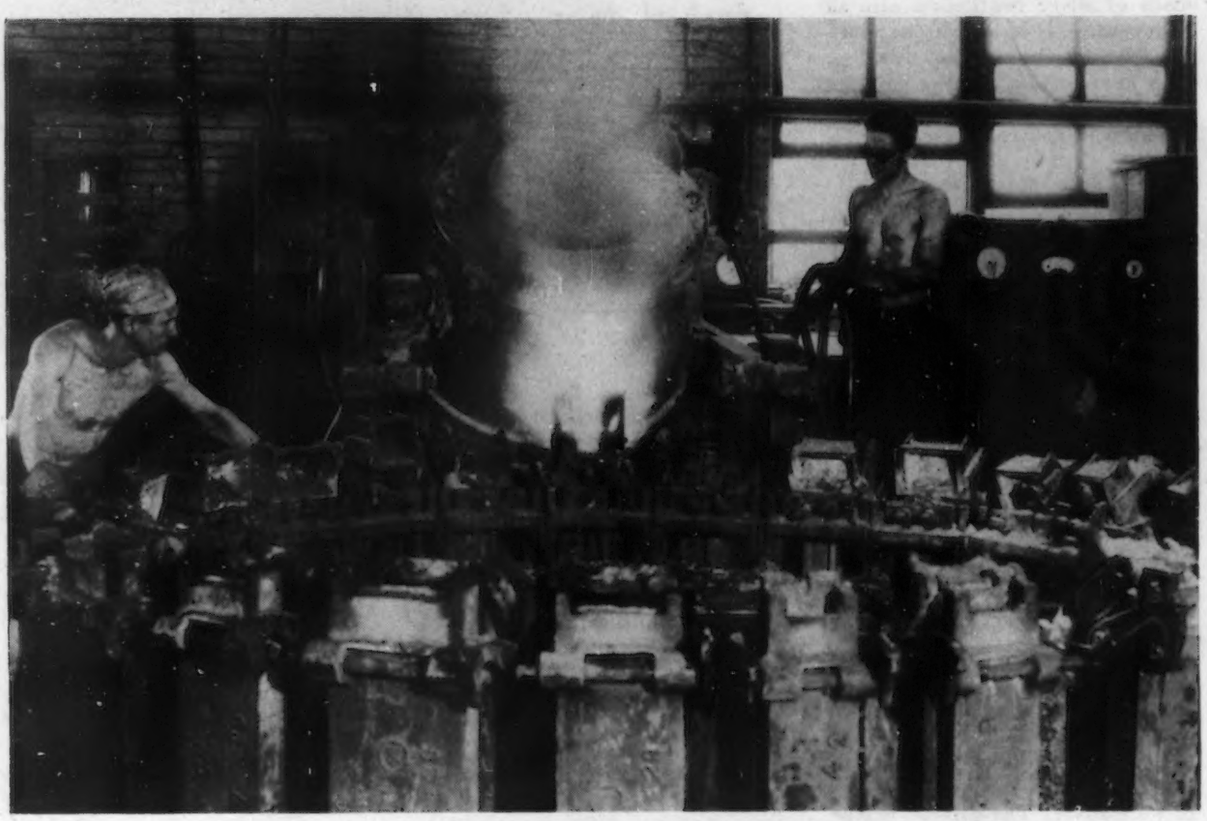


FIG. 3—Modern equipment is used for melting the nickel silver alloy. The electric furnace delivers the molten alloy at 2400 deg. F. into the rotating circle of molds.

o o o

of the belt traveling toward the operator.

Polishing practice differs more than most other processes in silver plating. At the plant of the International Silver Co. standards for the different classes of products have been carefully worked out. For quality products, a mixture of oil and pumice is used on walrus hide wheels followed by polishing with tripoli on rag wheels. This is a piecework operation followed by careful inspection and then followed immediately by cleaning and electroplating. For less expensive products the polishing operations are less elaborate. For all products care is exercised to keep the die surfaces of the drop hammers clean and well polished so as to improve the surface of the products as they reach the finishing department. The inspection before plating is particularly thorough. It being important at this point to cull out any irregularities in outline or size as rejections here are less expensive than rejections after plating.

Technique of Plating

After leaving the inspection room the flatware is transferred to the plating department. Shallow wooden trays are used for keeping the various items sorted and for actual handling.

When Are Parts Clean?

One of the secrets of successful silver plating, according to N. Promisel, research electro-chemist for the International Silver Co., is proper cleaning. The first of a series of cleaning operations preparatory to plating may be degreasing in standard trichlorethylene vapor equipment. Alternatively, the articles may first be washed in a solution of soap, such as whale oil soap or neutral soap chips. Following this, residual grease films, or other dirt, are treated in an alkaline cleaner containing special soaps and a mixture of alkaline salts. The parts after this treatment should pass the so-called water-break test. For even further assurance of complete removal of grease and dirt, and to assist in the removal of traces of the first cleaner itself, a second and milder alkaline is often employed, into which the articles go after being thoroughly rinsed in water. The second cleaner is often electrified, so that numerous bubbles of gas produced from the solution assist in cleaning, mainly by their mechanical "scrubbing" action, as well as by some added chemical action. Now the articles are thoroughly rinsed in clean water, and should be entirely free from grease, dirt, and cleaner residue.

After all this, the parts, though thoroughly clean in the above sense, might be covered with invisible chemical films, and to help remove these, and to act as a neutralizer if all soluble alkali has not been removed previously, a short dip of about 10 sec. in acid is used. A weak solution of either sulphuric or hydrochloric acid is commonly employed. As a final precaution serving several purposes, after rinsing in water following the acid dipping, there is a rinse in a sodium cyanide solution containing 10 oz. of the cyanide per gal., and then a further rinse in cold water. It is important to have the water used for rinsing as free from impurities as possible. A good pure water supply is one of the prime requisites for a manufacturer who

SILVER PLATING SOLUTIONS*

An increase in temperature of the silver plating bath is accompanied by a decrease in resistivity, a decrease in throwing power, and a decrease in polarization both at the anode and cathode. This means that heavier current density may be used without burning the deposit. From an industrial standpoint the production can be increased 50 per cent by increasing the temperature from 70 deg. F. to 90 deg. F.

An increase in current density gives an increase in throwing power and a brighter plate up to a certain point. It is difficult to state a maximum density. In experiments, from 30 to 40 amp. per sq. ft. have been secured.

An increase in silver content gives a decrease in resistivity, a decrease in throwing power, an increase in anodic polarization and a decrease in cathodic polarization. For good deposits concentrations range from 1 to 5 oz. per gal.

An increase in free cyanide is accompanied by a decrease in resistivity and an increase in throwing power.

An increase in the concentration of carbonate gives a decrease in resistivity, an increase in throwing power, and an increase in polarization. The increase of brightener (carbon disulphide) has little effect on resistivity or anode polarization but decreases the throwing power and also the cathode polarization. Up to about 0.2 oz. per gal. it brightens the deposit.

* From a study by B. Egeberg and N. Promisel.

Factory E - Flatware Dept. - Silver Plating Solution #26 - 386 gal.

Date	Lab. Anal. No.	Ag	Free KCN	K_2CO_3	KCl	Cu	Fe	Remarks
1-15-37	I 205	3.15 Troz/g	4.7 oz/g	8.45 oz/g	.01 oz/g	.04 oz/g	0 oz/g	Idle 2 wks
1-29-37	I 248	3.10	4.56					
2-13-37	I 449	3.09	4.85					
2-27-37	I 503	3.21	4.75					
3-15-37	I 722	3.15	4.62	9.20				No Zn
3-29-37	I 805	3.20	4.80					
4-16-37	I 1003	3.18	4.50					
4-30-37	I 1296	3.15	4.55					
5-14-37	I 1525	3.26	4.40	8.98	.02	.02	.00	Slt white ppt
5-28-37	I 1779	3.05	4.86					

FIG. 4—A typical plating control card taken from the laboratory files.

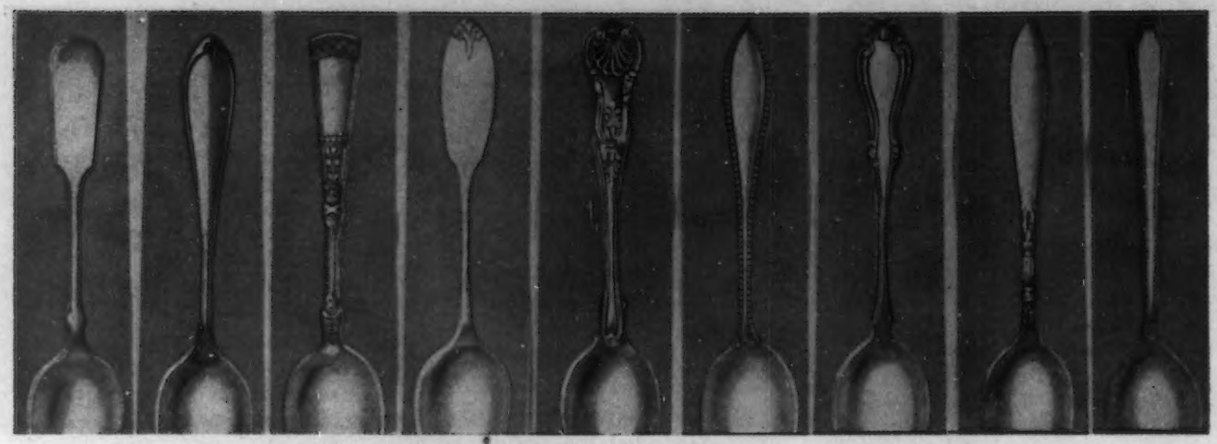


FIG. 5—This series, extending over 90 years, well illustrates the great variety in design of so simple a product as a teaspoon.

is to do silver plating. From the last cold water rinse the parts are carried to the plating tanks wet. In fact, the conveyer from the rinse to the first strike tank is equipped with overhead sprays to keep the work moist in case of delay in transit.

The first, or "strike" solution is weak in silver but relatively high in free sodium cyanide or free potassium cyanide. Mr. Promisel together with Dr. Egeberg, metallurgist of the International Silver Co., have devoted a great deal of time and study to the question of the best possible silver plating solutions and the most efficient silver plating technique and some of their findings which have been recorded in the proceedings of the Electrochemical Society are included on preceding page.

The solution found best for the strike coat on flatware is ½ oz. of silver cyanide per gallon and from 8 oz. to 12 oz. of free potassium cyanide.

Control of Baths

The International Silver Co. has some ten plants doing silver plating and the control of all the baths in all these plants emanates from the laboratories in Meriden under the supervision of Dr. Egeberg and Mr. Promisel. Each tank or bath is given a number and a card as shown at Fig. 4. Twice a month, samples of all solutions are sent to the laboratories for analysis and, based on the results, proper additions and alterations are made to keep all solutions up to standard. The strike coat is applied at a current density of about twenty amp. per sq. ft. and the time of immersion is about thirty seconds in the case of flatware. Frequently two strike coats are applied and then the work passes on to the standard plating operations.

o o o

Tanks used for silver plating are sometimes iron (usually Armco), sometimes rubber lined, and sometimes of ceramic construction.

Modern successful silver plating is always done with the solution agitated. This is accomplished in automatic plating equipment by the movement of the cathode bars. In still tanks plating pumps are sometimes used and sometimes rotating blades in the bottom of the tank. The anodes used are pure silver: just as pure as can be obtained, which is about 99.99 per cent.

The strike coat is usually applied at room temperature but the actual plating is done under carefully regulated temperature conditions. For flatware the solution is usually held accurately at 80° F. Because of the many plants of the International Silver Co. practice and equipment vary somewhat at different places. Standard practice, however, may be said to be on an automatic machine of fairly standard design although in most cases the machines have been built to individual specifications. The machines are hand loaded, the individual parts being suspended in slotted strips on the cathode racks. After the loading of such racks the process follows through an automatic sequence, which in from twenty minutes to two hours brings them out plated, and from another machine rinsed and dried ready for delivery to the final finishing department.

A standard plating solution is 3 to 4 oz. silver cyanide per gal. plus 4 to 6 oz. of free potassium cyanide and 6 to 8 oz. per gal. potassium carbonate, with a small amount, pehaps ½ fluid oz. per gal., of carbon disulphide, used as a brightener. The current density ranges from 5 to 15 amp. depending upon the type of work. For standard flatware it is 8 amp. per sq. ft.

The above described sequence is that used for plating the base metals previously mentioned, namely nickel silver and white metal. For plating over steel some changes are made, a common one being the addition of copper to the strike solution. Sometimes copper cyanide is added and sometimes one or more copper anodes are introduced along with the regular silver anodes.

Final Finishing

Silver, as electro-deposited has a semi-bright milky appearance and requires polishing for development of beauty and lustre. Depending upon the shifting taste of the public, the silver is finished either "bright" or "butler." The former is a mirror-like surface obtained by applying the article against a revolving buff wheel frequently coated with rouge or similar mild abrasive. The butler finish usually obtained by means of wire scratch brushes, is a semi-bright or dulled finish. The finish is subject to great variations depending upon the construction of the brush.

After having brought the silver plate to the desired finish as described above, the articles may require further washing, where-

after they are wrapped and are then ready for shipment to the customer.

Design and Sales Appeal

The design factor is growing more and more important throughout the metal fabricating industry and in the case of flatware, next to quality and the reputation of the manufacturer, design has the biggest selling influence. Thus, the large manufacturers employ staffs of artists and designers and build their sales campaigns around that particular department. The International Silver Co. has from 15 to 20 designers constantly at work on new models and anyone who has not given particular attention to this feature will be surprised at the wide variety of design possible in such a simple item as a teaspoon. Some of the typical designs from different periods are indicated in Fig. 5.

Of course the designer must keep in mind other factors than selling value because for one thing the cost of production varies noticeably from one design to another. Of particular significance is the amount of scrap. A design which makes it possible to blank out a teaspoon with little or no scrap may make a difference in the overall production cost of as much as 5 per cent. In blanking and trimming the loss in scrap may run as high as 35 to 40 per cent.

The question of quality of silver plated products is difficult to accurately specify. About the best that can be done is to state a few negatives. Certainly quality does not depend solely on the thickness of the deposit, nor solely upon the purity of the anodes. Some recent popular articles have stated that the quality of silver plate is determined by the amount of silver used per sq. in. of total surface. After following the elaborate operations at a plant such as one of those of the International Silver Co. it is easy to see that a well cleaned product with a perfectly adherent plate, even though of lesser thickness, would be more desirable than a poorly adherent plate of heavy silver deposit.

Another misleading term frequently used in an attempt to designate quality is that of triple-X or triple plate, or quadruple-X or quadruple plate. These particular terms are not recognized in the trade as having any definite specifications back of them. The quality of a product depends fully as much upon the distribution of the plate as upon its weight. The reason for this is easy to understand if the variation in plating technique is understood. Suppose, for instance, a heavy deposit say, 12 oz. of silver per gross of spoons is specified. This amount of silver can be put on with such poor distribution that certain parts of the surfaces may have relatively thin coatings and these parts may happen to be the very parts subjected to severest wear in service. On the other hand a total deposit of 8 oz. of silver per gross properly distributed in relation to the parts receiving the greatest wear may result in a longer life product; this of course also depending upon many factors in the plating technique which have a strong bearing on quality.

In ordinary use plated knives, forks and spoons wear through first at certain high points particularly the points of contact with the table. To overcome this tendency, manufacturers have adopted several different methods. One is to plate an extra heavy coat at these contact points. This is called an overlay or sectional plate. Another method is to actually cut out a section of the base metal and insert at that point a piece of solid silver prior to the usual plating operation. With the International Silver Co. this method is known as inlay. Some manufacturers attempt to describe quality directly in terms of life, but when the varied conditions of use are considered, the difficulty in this direction will be understood.

World Business Activity Maintained

WORLD industrial activity was maintained at a high level during June, according to the regular monthly survey of the National Industrial Conference Board. Output advanced in Great Britain, Canada, Germany, Italy, Austria, Poland, Czechoslovakia, and in most of the South American countries. These gains, however, were partly offset by recessions in the United States, France, Denmark, and South Africa.

In Great Britain, business activity moved contra-seasonally into new high ground. British business has been well sustained, and increased costs have as yet had no apparent adverse effect on demand. The iron and steel and related industries are operating close to capacity.

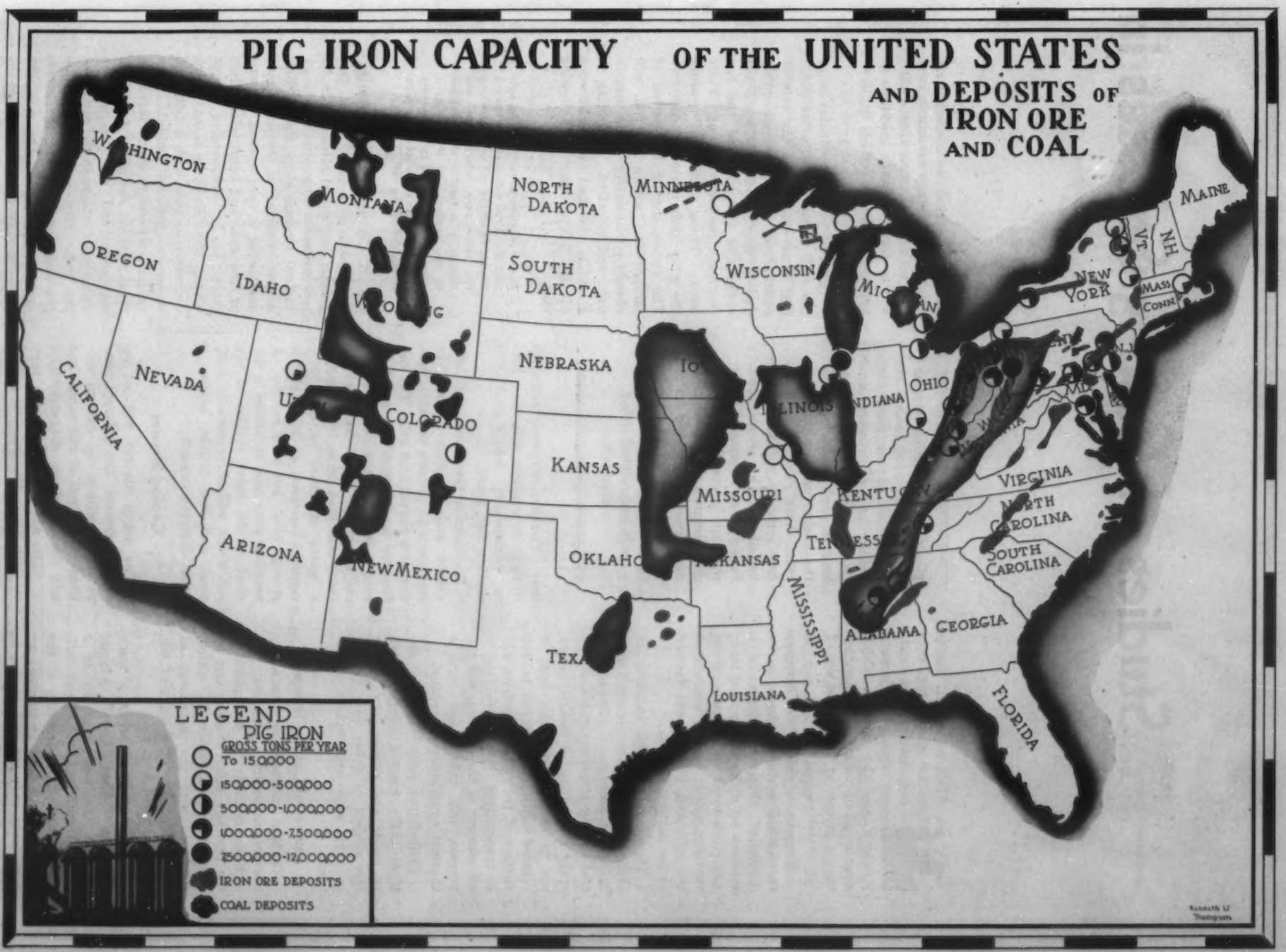
The conference board reports that world recovery has now progressed to the point where many countries are finding themselves progressively less able to satisfy their needs from domestic sources. Thus, despite self-sufficiency schemes, exchange restrictions, quotas, and tariffs, foreign trade has expanded substantially. Revised figures show that the physical volume of world trade in 74 countries during the initial quarter of this year rose to within 7.4 per cent of the 1929 level. Value figures do not reveal such an impressive trend because gold prices are still well below the 1929 level. On the 1929 base the value index for May of this year stood at 46.3, as compared with 46.8 in April, and 36.6 in May, 1936.

Porcelain Enamelers To Convene Oct. 11-12

OCT. 11-12 has been selected as the date for the seventh annual meeting of the Porcelain Enamel Institute in Chicago. In addition to the election of officers for 1938, a number of well-known speakers, including Prof. R. M. King, the institute's technical director, are scheduled to address the assemblage on the problems faced by the industry. Immediately following the meeting, the enamelers will entrain for the Ohio State University in Columbus, Ohio, where the second institute forum will take place. The tentative plan for the forum includes discussions on plant maintenance, enamel shop costs, color matching and silk screen processes and group sessions on cast iron, sheet iron and hollow ware.

STEEL INGOT AND FINISHED STEEL CAPACITY OF THE UNITED STATES

PIG IRON CAPACITY OF THE UNITED STATES AND DEPOSITS OF IRON ORE AND COAL



Courtesy of The American Iron and Steel Institute

Studies of Casting Stresses in

THE successful application of any engineering cast iron is dependent upon its ultimate strength and the stresses which may be set up during the manufacturing process or during the use of the material.

When using chilled iron castings three major stresses determine the limits of their usefulness: (1) stresses set up by the applied load; (2) stresses set up by temperature variance within various sections of the roll; and (3) stresses formed in the casting process.

Therefore the load capacity of chilled iron is entirely dependent upon the amount of temperature and casting stresses combined.

By the rolling of metals, either hot or cold, considerable heat is created on, or transferred to, the surface of the roll. This heat will be transmitted from the surface to all sections of the casting, and the process will take place until a thermal equilibrium is created.

Chilled iron rolls which are applied in the organic industry, such as paper and rubber, are by far less subject to either very drastic or very wide temperature variations.

Sources of Casting Stresses

Casting stresses are created by the manufacturing process; by molding methods; by treatment of the castings after pouring and by stripping from the mold, which, combined with the metallurgy of chilled iron, are of a complex nature in chilled iron rolls.

Casting stresses can be of such magnitude that under normal stresses the load capacity of a roll is insufficient and causes failure as soon as a fraction of the predetermined load is applied; an experience only too well known to the roll maker as well as the roll user. Foundry stresses, unknown in their magnitude, will often lead to controversy between roll makers and users.

IF abnormal, casting stresses may lead to roll failures at a fraction of the load for which the rolls were designed. This, in turn, may lead to controversy between the maker and user of the rolls. This report of Mr. Erler's studies, presented on behalf of the American Foundrymen's Association at the last International Foundry Congress, held at Dusseldorf, Germany, should be of pertinent interest, therefore, to all makers and users of rolls and related rolled products.

To visualize the stresses in their extent and direction it will be necessary to picture the solidification of a chilled iron roll. The roll founder must select his metal in such a way that the carbon in the chilled section should be in an entirely combined form, so producing a white structure with a pronounced ingotism; an iron which is strong, hard, but very brittle. A pearlitic gray iron structure is desired in the inner section of the roll which will be reasonably soft, weak and less brittle, having a great damping capacity.

Cooling Stresses

Two major factors will set up cooling stresses: the different temperatures within the various sections of the roll at the same time and the shrinkage characteristics of white and gray iron which vary entirely above the pearlitic point.[1]

During the pouring, the metal next to the chill will solidify instantaneously when coming in contact with the same, so that a shell will be formed with a thickness of approximately the desired depth of chill.

The roll loses its contact with the chill about 8 min. after pouring, after which time the rate of cooling will decrease considerably due to the gas film between the chills and the roll and the low thermal conductivity of white metal. These phenomena produce the gray iron center of the roll. The stress, during the period of solidification within the roll, will change continuously in its magnitude and direction. According to E. Schuz[2] the final casting stresses of chilled iron have the following stress:

> **A compression zone from the outside of the roll will decrease toward the inside of the roll until reaching the value zero, which then will change to a tension stress further to the center until it reaches a value which is equal to the tensile strength of the material in the pipe or middle of the roll.**

J. S. Caswell[3], in his investigation, discussed a longitudinal, tangential and radial stresses. In his conclusion the tangential and longitudinal stresses show similarities; a tension stress on the outer zone decreasing to zero toward the axis of the roll and continuing from there as a compressive stress which, after reaching a maximum, decreases to zero with a tensional stress in the roll middle. The radial compressive stress increases from zero on the outer face to a maximum and declines to zero again with tension in the middle of the roll. His investigation emphasizes the effect on the stress system of stripping the roll; the accelerated cooling will increase the shrinkage rate at every point, and

Chilled Iron Rolls

By J. ERLER

Chief Metallurgist, Farrel-Birmingham Inc., Ansonia, Conn.

it is fastest at the surface but the shrinkage at any point is resisted by the slower cooling metal nearer the center.

During the period of cooling of the roll even the chilled iron with its high rigidity at elevated temperature releases a great deal of stress, so that the final stress within the roll will be of a very complex nature and hard to visualize both in extent and direction.

The internal stresses exist in the form of a balanced system in any metallic structure. Both in the ferrous and non-ferrous metals a great deal of attention has been given to internal stresses either produced through form changes or cooling.[4] To study stresses it is most essential that the test pieces investigated should have a rather simple form. Fortunately, the cylindrical form of chilled iron rolls represents a body in which stresses can be easily measured.

For rods, bars and pipes Heyn's[4] formula has been the basis for most investigators. This method depends on the removal of thin layers, resulting in a deformation of the remaining metal due to the unbalanced system of internal

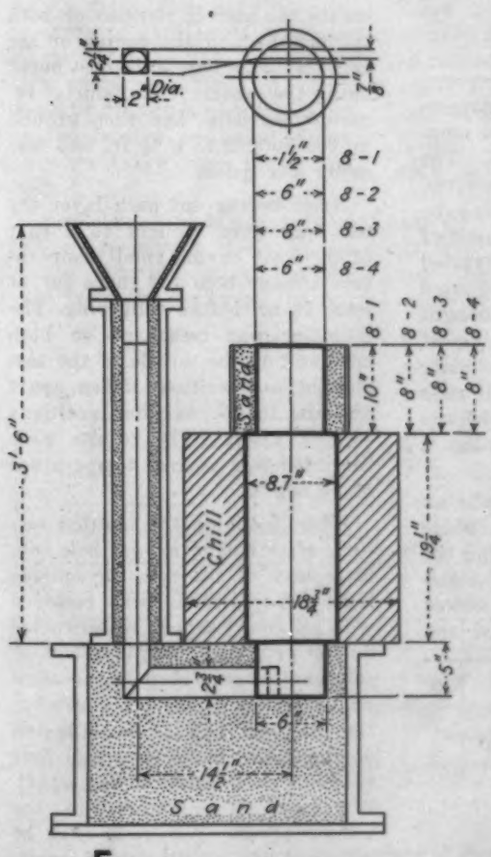
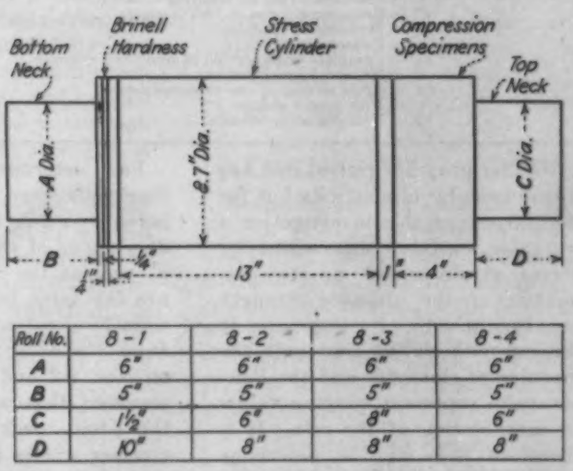


FIG. 1—Arrangement of the mold.



Roll No.	8-1	8-2	8-3	8-4
A	6"	6"	6"	6"
B	5"	5"	5"	5"
C	1½"	6"	8"	6"
D	10"	8"	8"	8"

FIG. 2—Dimensions of test cylinder.

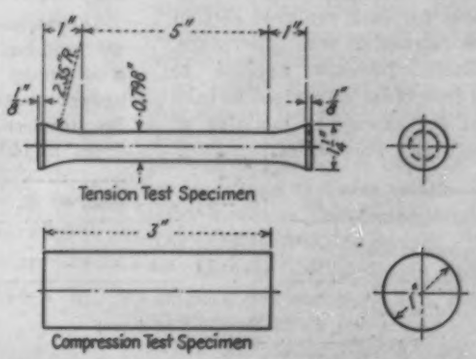


FIG. 3—Dimensions of tension and compression test specimens.

stresses. Heyn's formula enables one to calculate the internal stresses for each layer.

$$1.\quad S_n = \frac{E}{L^1} \cdot \frac{d^2_n (L_n - L_o) - d^2_{n-1} (L_n - L_o)}{d^2_{n-1} - d^2_n}$$

S = Stress in nth layer.
E = Modulus of elasticity.
L^1 = Length turned down.
d_n = Diameter of turned down part after nth cut.
d_{n-1} = Diameter of turned down part after (n-1) cut.
L_o = Initial length of bar.
L_n = Length of bar after nth cut.
L_{n-1} = Length of bar after (n-1)th cut.

Based on Heyn's work, Sachs[4] designed a method which will give the accurate determination of stresses in a triaxial system. His work in the investigation of stresses in drawn brass pipe is carried out in a cylindrical form. The change of length and diameter after the removal of each layer allows an accurate calculation of longitudinal, tangential and radial stresses according to the following formula:

2. *Longitudinal Stress*

$$s = s' + s'' = \frac{E}{1-\gamma^2} \cdot \frac{(F_b - F)\ (d\alpha + \gamma d\beta)}{dF} - \frac{E}{1-\gamma^2} \cdot (\alpha + \gamma\beta)$$

3. *Tangential Stress*

$$t = t' + t'' = \frac{E}{1-\gamma^2} \cdot \frac{(F_b - F)\ (d\beta + \gamma d\alpha)}{dF} - \frac{E}{1-\gamma^2} \cdot \frac{F_b + F}{2F} \times (\beta + \gamma\alpha)$$

4. *Radial Stress*

$$r = r' = \frac{E}{1-\gamma^2} \cdot \frac{(F_b - F)}{2F} \cdot (\beta + \gamma\alpha)$$

s' t' r' = Released stress by removal of metal.
s'' t'' r'' = Remaining stress in test piece.
E = Modulus of elasticity.
γ = Poisson ratio.
F_b = Complete cross section of undrilled cylinder.
F = Removed cross section.
dF = Cross section of one removed layer.
$d\alpha$ = Unit length change.
β = Unit diameter change.

Neither gray nor chilled iron has a true modulus of elasticity but for the purpose of this investigation a workable modulus determined by stress strain-curves up to one-quarter of the ultimate strength can be applied[5]. Furthermore, in dealing with chilled iron both the modulus of elasticity and the Poisson ratio represent varying values in each section of the roll. It is therefore necessary to determine these two factors over the entire cross section in order to find the modulus of elasticity and the Poisson ratio for each removed section and the remaining one. Therefore, the Sachs formula applied to chilled iron must be revised to take care of the change in modulus of elasticity and Poisson ratio:

5. *Longitudinal Stress:*

$$s = s' + s'' = \frac{E_2}{1-\gamma_2^2} \cdot \frac{(F_b - F)\ (d\alpha + \gamma_1 d\beta)}{dF} - \frac{E_1}{1-\gamma_1^2} \cdot (\alpha + \gamma\beta)$$

6. *Tangential Stress:*

$$t = t' + t'' = \frac{E_2}{1-\gamma_2^2} \cdot \frac{(F_b - F)\ (d\beta + \gamma_2 \alpha)}{dF} - \frac{E_1}{1-\gamma_1^2} \cdot \frac{F_b + F}{2F} \cdot (\beta + \gamma\alpha)$$

7. *Radial Stress:*

$$r = r' = \frac{E_1}{1-\gamma_1^2} \cdot \frac{F_b - F}{2F} \cdot (\beta + \gamma\alpha)$$

E_1 and γ_1 = Modulus of elasticity and Poisson ratio of removed section.
E_2 and γ_2 = Modulus of elasticity and Poisson ratio of remaining section.

For the experimental work, chilled iron rolls with 8.7 in. diameter and 19 in. long in the "as cast" state were selected because the procedure required machining to close limits — ±0.002 in. Furthermore the calipering of length and diameter to ±0.0001 in. at various positions could be done more easily than with specimens of large dimensions.

The rolls were set up for pouring with the ordinary foundry practice for chilled iron rolls used in this country and according to dimensions as shown in Fig. 1.

For determining the stresses four rolls were selected and numbered 8-1, 8-2, 8-3, and 8-4. The dimensions of the rolls themselves, as well as the runner and ingate, are the same but the top neck of rolls Nos. 8-1 and 8-3 was varied from the accepted standard used on Nos. 8-2 and 8-4. The thought occurred that a quick setting of the top neck may influence stresses within the roll. All rolls have a clear chill of ½ in. with the exception of No. 8-4 which has a chill depth of ¾ in.

In the making of these rolls an attempt has been made to produce a minimum stress by selecting the proper melting, pouring and molding practice. The metal was melted from a 100 per cent chilled roll scrap mixture, hand picked, from rolls of the same diameter, depth of chill and composition. The melting unit was a basic electric furnace with a carbide slag.

All rolls were made from the same heat, and in order to increase the depth of chill in No. 8-4 pyrites was added to the metal in the ladle at 2650 deg. F.

In Table I all data are given which have been recorded during the manufacture of the rolls. The rolls were left in the chills for 80 hr. to allow very slow cooling, and when stripped from the chills measured approximately 125 deg. F.

The rolls were ground with an emery wheel according to the roll grinding practice about 0.05 in. on the side in order to allow the correct measuring of diameter and length of the test pieces. After the final grinding the rolls were cut in three sections (Fig. 2), one for stress determination by removal of layers; one for specimens of compression test bars, and one for hardness test and metallographic characteristics over the entire cross-section.

Because of the difficulty of turning chilled iron without heating the test piece, which might relieve stresses, as well as the desire to obtain the correct stresses on both the outside and the center of the roll, the large logs were first bored out in the center, 1 in. diameter removed per bore, and then ground on the outside to a ¼ in. less diameter per grind.

After boring out each layer the test logs were brought to a part of the room having small temperature change and left there for at least 10 hr. before calipering. The diameter was measured on both ends and on the middle of the test piece in four positions 45 deg. apart and the length on four positions 90 deg. apart. The results were corrected to a normal temperature of 70 deg. F.

When reaching the mottled section, after boring a 6-in. hole into the center of the roll, the outside layer—⅛ in. thick—was removed with an emery wheel, water-cooled during grinding. The length measurements were taken in the same way as on the boring procedure but the diameter had to be calipered on the inside of the bore and four readings were taken, 45 deg. apart. Diameter determinations in the middle of the roll could not be calipered due to difficulty of insert-

ing a gage exactly to that point. It was necessary to make a small finishing cut in the bore to locate and mark the points for calipering, which accounts for the boring increase to over 6.002 in.

The points for length measurement had to be relocated too in order to allow a machining of the shell to the minimum thickness by grinding. The average grinding and boring results are given in Table II.

The gages used for calipering of the specimens were correct to 0.0001 in. and checked before each reading with standard Invar bars. The boring and grinding were done with a maximum allowance of ±0.002 in.

When the test pieces reached a dimension of approximately ¼ in. in thickness the machining had to be discontinued, due to difficulty of proper alinement and danger of cracking the shell by grinding wheel pressure.

Table No. 1: Manufacturing Data

	No. 8-1	No. 8-2	No. 8-3	No. 8-4
Furnace temperature, deg. F.	2755	2755	2755	2755
Pouring temperature, deg. F.	2354	2354	2345	2340
Temperature of chills before pouring, deg. F.	270	280	270	280
Pouring time, sec.	12	16	15	11
Roll stripped from chill after pouring, hr.	80	80	80	80
Diameter in rough, in.	8.71	8.70	8.73	8.71
Length in rough, in.	19	19	19	19
Diameter of test piece after grinding, in.	8.6221	8.6164	8.6165	8.5798
Length of test piece after grinding, in.	12.9121	12.9503	12.9689	12.9727

CHEMICAL ANALYSIS

	No. 8-1	No. 8-2	No. 8-3	No. 8-4
TC	3.54	3.51	3.50	3.50
Si	0.52	0.52	0.52	0.52
Mn	0.25	0.25	0.25	0.26
S	0.03	0.032	0.03	0.05
P	0.39	0.42	0.41	0.41
Clear chilled iron, in.	½	½	½	⅝
Mottled iron, in.	⅞	⅞	⅞	⅝

Relative Modulus of Elasticity

For determining the relative modulus of elasticity, as well as the Poisson ratio of the entire cross section, tension and compression specimens (Fig. 3) were taken from a roll of the same dimensions —8.7 in. diameter and 19 in. long. The depth of chill made it impossible to obtain a test bar of an entire white structure. A small amount of gray iron was present in both the tension and compression bars when taken from the chilled section.

The relative modulus of a force which is one-quarter or less of the ultimate strength shows an increase from the center of the roll to the outside (Fig. 4). Even though the bars were not of the same dimensions, the modulus compression was equal to that by tension within the limits of the experimental error when the stress did not exceed one-quarter of that of the ultimate tension.

Difficulty will arise when stresses exceed this limit and it will be necessary to select the proper relative modulus of elasticity from the stress-strain diagram. This will occur more often in the gray iron section than in either the mottled or chilled iron area due to the high rigidity and ultimate strength of the latter.

Roll No. 8-4 with the deepest chill had a smaller area of mottled iron than the other rolls due to the effect of the increased sulphur. It was permissible, therefore, to use the same relative modulus curve in all four cases. For check purposes compression test bars 4 in. long and 1 in. in diameter were taken from each 8.7 in. diameter roll. The results were compared with those in the above curve and checked within 5 per cent.

It was impossible to determine accurately the Poisson ratio and stresses up to 10,000 lb. per sq. in. with the instruments available. Therefore, this factor was obtained from the formula[8]:

$$8.\quad E_c = \frac{E_t}{3\,(1-2\gamma)}$$

$$9.\quad \gamma = 0.500 - 0.167\,\frac{E_t}{E_c}$$

E_t = Modulus of elasticity by tension
E_c = Modulus of elasticity by compression
γ = Poisson ratio

According to the formula, the Poisson ratio for a stress of one-quarter of the ultimate tensional strength is equal to that of steel, one-third. Variation of the factors will have a small effect on the results because the volume is in the form of a square or a product of small dimensions.

Discussion of Results

The results which are plotted against the cross-section of the roll in Figs. 5 to 8 show that those stresses below the zero line are negative or compressive, and those above, positive or tensional stresses. The longitudinal stresses are in tension in the middle of all four rolls and compressive on the outside. The increase in depth of chill reduces tension forces on the inside and increases the compression on the outside zone of the roll.

There is an indication that a smaller size top neck will have a similar effect on the stress system when comparing Nos. 8-2 and 8-3 rolls. The No. 8-1 roll, with the

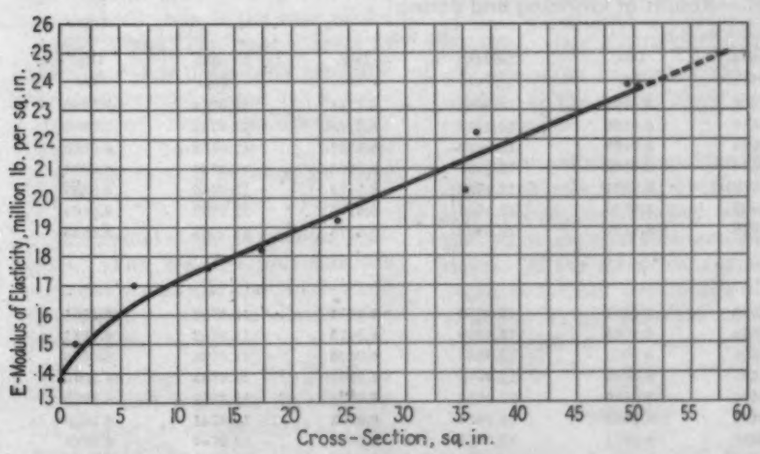


FIG. 4—Relation between modulus of elasticity and section.

stresses. Heyn's formula enables one to calculate the internal stresses for each layer.

$$1.\quad S_n = \frac{E}{L^1}\cdot\frac{d^2_n\,(L_n - L_o) - d^2_{n-1}\,(L_{n-1} - L_o)}{d^2_{n-1} - d^2_n}$$

S = Stress in nth layer.
E = Modulus of elasticity.
L^1 = Length turned down.
d_n = Diameter of turned down part after nth cut.
d_{n-1} = Diameter of turned down part after (n-1) cut.
L_o = Initial length of bar.
L_n = Length of bar after nth cut.
L_{n-1} = Length of bar after (n-1)th cut.

Based on Heyn's work, Sachs[4] designed a method which will give the accurate determination of stresses in a triaxial system. His work in the investigation of stresses in drawn brass pipe is carried out in a cylindrical form. The change of length and diameter after the removal of each layer allows an accurate calculation of longitudinal, tangential and radial stresses according to the following formula:

2. *Longitudinal Stress*

$$s = s' + s'' = \frac{E}{1-\gamma^2}\cdot\frac{(F_b - F)\,(d\alpha + \gamma d\beta)}{dF} - \frac{E}{1-\gamma^2}\cdot(\alpha + \gamma\beta)$$

3. *Tangential Stress*

$$t = t' + t'' = \frac{E}{1-\gamma^2}\cdot\frac{(F_b - F)\,(d\beta + \gamma d\alpha)}{dF} - \frac{E}{1-\gamma^2}\cdot\frac{F_b + F}{2F}\times(\beta + \gamma\alpha)$$

4. *Radial Stress*

$$r = r' = \frac{E}{1-\gamma^2}\cdot\frac{(F_b - F)}{2F}\cdot(\beta + \gamma\alpha)$$

s' t' r' = Released stress by removal of metal.
s'' t'' r'' = Remaining stress in test piece.
E = Modulus of elasticity.
γ = Poisson ratio.
F_b = Complete cross section of undrilled cylinder.
F = Removed cross section.
dF = Cross section of one removed layer.
$d\alpha$ = Unit length change.
β = Unit diameter change.

Neither gray nor chilled iron has a true modulus of elasticity but for the purpose of this investigation a workable modulus determined by stress strain-curves up to one-quarter of the ultimate strength can be applied[5]. Furthermore, in dealing with chilled iron both the modulus of elasticity and the Poisson ratio represent varying values in each section of the roll. It is therefore necessary to determine these two factors over the entire cross section in order to find the modulus of elasticity and the Poisson ratio for each removed section and the remaining one. Therefore, the Sachs formula applied to chilled iron must be revised to take care of the change in modulus of elasticity and Poisson ratio:

5. *Longitudinal Stress*:

$$s = s' + s'' = \frac{E_2}{1-\gamma_2^2}\cdot\frac{(F_b - F)\,(d\alpha + \gamma_1 d\beta)}{dF} - \frac{E_1}{1-\gamma_1^2}\cdot(\alpha + \gamma\beta)$$

6. *Tangential Stress*:

$$t = t' + t'' = \frac{E_2}{1-\gamma_2^2}\cdot\frac{(F_b - F)\,(d\beta + \gamma_2 d\alpha)}{dF} - \frac{E_1}{1-\gamma_1^2}\cdot\frac{F_b + F}{2F}\cdot(\beta + \gamma\alpha)$$

7. *Radial Stress*:

$$r = r' = \frac{E_1}{1-\gamma_1^2}\cdot\frac{F_b - F}{2F}\cdot(\beta + \gamma\alpha)$$

E_1 and γ_1 = Modulus of elasticity and Poisson ratio of removed section.
E_2 and γ_2 = Modulus of elasticity and Poisson ratio of remaining section.

For the experimental work, chilled iron rolls with 8.7 in. diameter and 19 in. long in the "as cast" state were selected because the procedure required machining to close limits — ±0.002 in. Furthermore the calipering of length and diameter to ±0.0001 in. at various positions could be done more easily than with specimens of large dimensions.

The rolls were set up for pouring with the ordinary foundry practice for chilled iron rolls used in this country and according to dimensions as shown in Fig. 1.

For determining the stresses four rolls were selected and numbered 8-1, 8-2, 8-3, and 8-4. The dimensions of the rolls themselves, as well as the runner and ingate, are the same but the top neck of rolls Nos. 8-1 and 8-3 was varied from the accepted standard used on Nos. 8-2 and 8-4. The thought occurred that a quick setting of the top neck may influence stresses within the roll. All rolls have a clear chill of ½ in. with the exception of No. 8-4 which has a chill depth of ¾ in.

In the making of these rolls an attempt has been made to produce a minimum stress by selecting the proper melting, pouring and molding practice. The metal was melted from a 100 per cent chilled roll scrap mixture, hand picked, from rolls of the same diameter, depth of chill and composition. The melting unit was a basic electric furnace with a carbide slag.

All rolls were made from the same heat, and in order to increase the depth of chill in No. 8-4 pyrites was added to the metal in the ladle at 2650 deg. F.

In Table I all data are given which have been recorded during the manufacture of the rolls. The rolls were left in the chills for 80 hr. to allow very slow cooling, and when stripped from the chills measured approximately 125 deg. F.

The rolls were ground with an emery wheel according to the roll grinding practice about 0.05 in. on the side in order to allow the correct measuring of diameter and length of the test pieces. After the final grinding the rolls were cut in three sections (Fig. 2), one for stress determination by removal of layers; one for specimens of compression test bars, and one for hardness test and metallographic characteristics over the entire cross-section.

Because of the difficulty of turning chilled iron without heating the test piece, which might relieve stresses, as well as the desire to obtain the correct stresses on both the outside and the center of the roll, the large logs were first bored out in the center, 1 in. diameter removed per bore, and then ground on the outside to a ¼ in. less diameter per grind.

After boring out each layer the test logs were brought to a part of the room having small temperature change and left there for at least 10 hr. before calipering. The diameter was measured on both ends and on the middle of the test piece in four positions 45 deg. apart and the length on four positions 90 deg. apart. The results were corrected to a normal temperature of 70 deg. F.

When reaching the mottled section, after boring a 6-in. hole into the center of the roll, the outside layer—⅛ in. thick—was removed with an emery wheel, water-cooled during grinding. The length measurements were taken in the same way as on the boring procedure but the diameter had to be calipered on the inside of the bore and four readings were taken, 45 deg. apart. Diameter determinations in the middle of the roll could not be calipered due to difficulty of insert-

ing a gage exactly to that point. It was necessary to make a small finishing cut in the bore to locate and mark the points for calipering, which accounts for the boring increase to over 6.002 in.

The points for length measurement had to be relocated too in order to allow a machining of the shell to the minimum thickness by grinding. The average grinding and boring results are given in Table II.

The gages used for calipering of the specimens were correct to 0.0001 in. and checked before each reading with standard Invar bars. The boring and grinding were done with a maximum allowance of ±0.002 in.

When the test pieces reached a dimension of approximately ¼ in. in thickness the machining had to be discontinued, due to difficulty of proper alinement and danger of cracking the shell by grinding wheel pressure.

Table No. 1: Manufacturing Data

	No. 8-1	No. 8-2	No. 8-3	No. 8-4
Furnace temperature, deg. F.	2755	2755	2755	2755
Pouring temperature, deg. F.	2354	2354	2345	2340
Temperature of chills before pouring, deg. F.	270	280	270	280
Pouring time, sec.	12	16	15	11
Roll stripped from chill after pouring, hr.	80	80	80	80
Diameter in rough, in.	8.71	8.70	8.73	8.71
Length in rough, in.	19	19	19	19
Diameter of test piece after grinding, in.	8.6221	8.6164	8.6165	8.5798
Length of test piece after grinding, in.	12.9121	12.9503	12.9689	12.9727

CHEMICAL ANALYSIS

	No. 8-1	No. 8-2	No. 8-3	No. 8-4
TC	3.54	3.51	3.50	3.50
Si	0.52	0.52	0.52	0.52
Mn	0.25	0.25	0.25	0.26
S	0.03	0.032	0.03	0.05
P	0.39	0.42	0.41	0.41
Clear chilled iron, in.	½	½	½	⅜
Mottled iron, in.	⅞	⅞	⅞	⅝

Relative Modulus of Elasticity

For determining the relative modulus of elasticity, as well as the Poisson ratio of the entire cross section, tension and compression specimens (Fig. 3) were taken from a roll of the same dimensions —8.7 in. diameter and 19 in. long. The depth of chill made it impossible to obtain a test bar of an entire white structure. A small amount of gray iron was present in both the tension and compression bars when taken from the chilled section.

The relative modulus of a force which is one-quarter or less of the ultimate strength shows an increase from the center of the roll to the outside (Fig. 4). Even though the bars were not of the same dimensions, the modulus compression was equal to that by tension within the limits of the experimental error when the stress did not exceed one-quarter of that of the ultimate tension.

Difficulty will arise when stresses exceed this limit and it will be necessary to select the proper relative modulus of elasticity from the stress-strain diagram. This will occur more often in the gray iron section than in either the mottled or chilled iron area due to the high rigidity and ultimate strength of the latter.

Roll No. 8-4 with the deepest chill had a smaller area of mottled iron than the other rolls due to the effect of the increased sulphur. It was permissible, therefore, to use the same relative modulus curve in all four cases. For check purposes compression test bars 4 in. long and 1 in. in diameter were taken from each 8.7 in. diameter roll. The results were compared with those in the above curve and checked within 5 per cent.

It was impossible to determine accurately the Poisson ratio and stresses up to 10,000 lb. per sq. in. with the instruments available. Therefore, this factor was obtained from the formula*:

$$8.\quad E_c = \frac{E_t}{3\,(1-2\gamma)}$$

$$9.\quad \gamma = 0.500 - 0.167\,\frac{E_t}{E_c}$$

E_t = Modulus of elasticity by tension
E_c = Modulus of elasticity by compression
γ = Poisson ratio

According to the formula, the Poisson ratio for a stress of one-quarter of the ultimate tensional strength is equal to that of steel, one-third. Variation of the factors will have a small effect on the results because the volume is in the form of a square or a product of small dimensions.

Discussion of Results

The results which are plotted against the cross-section of the roll in Figs. 5 to 8 show that those stresses below the zero line are negative or compressive, and those above, positive or tensional stresses. The longitudinal stresses are in tension in the middle of all four rolls and compressive on the outside. The increase in depth of chill reduces tension forces on the inside and increases the compression on the outside zone of the roll.

There is an indication that a smaller size top neck will have a similar effect on the stress system when comparing Nos. 8-2 and 8-3 rolls. The No. 8-1 roll, with the

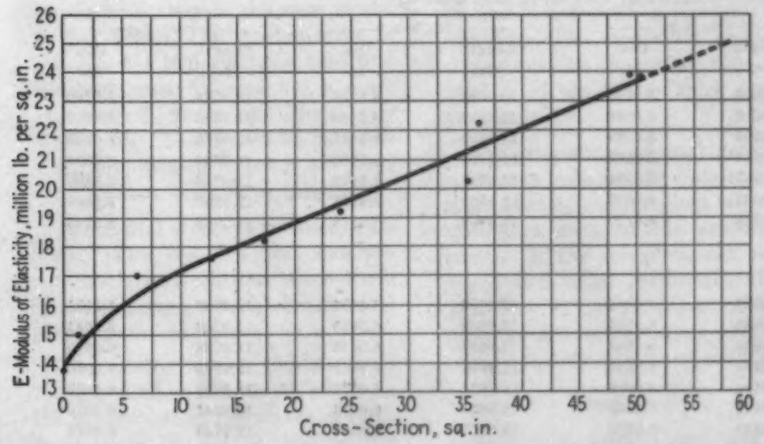
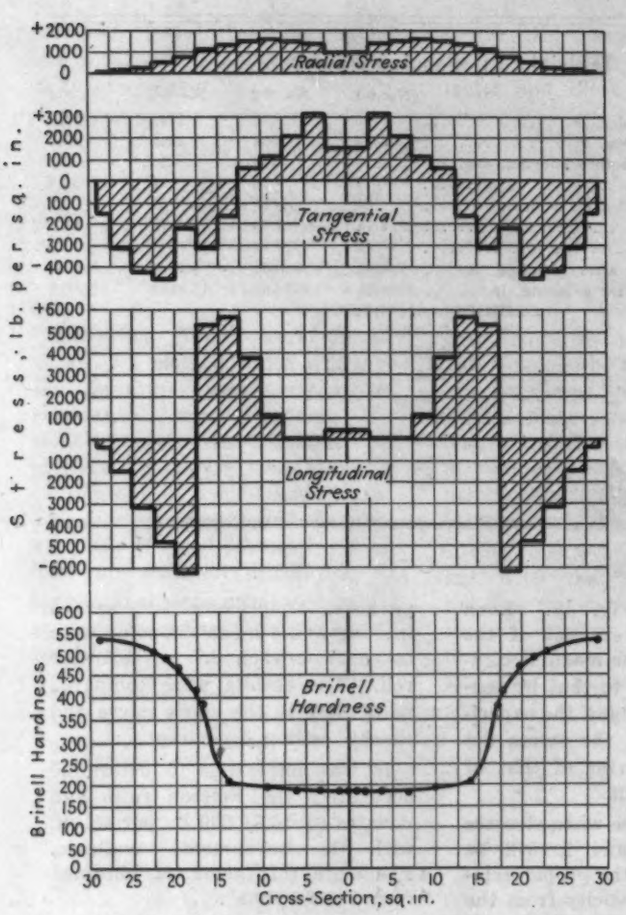
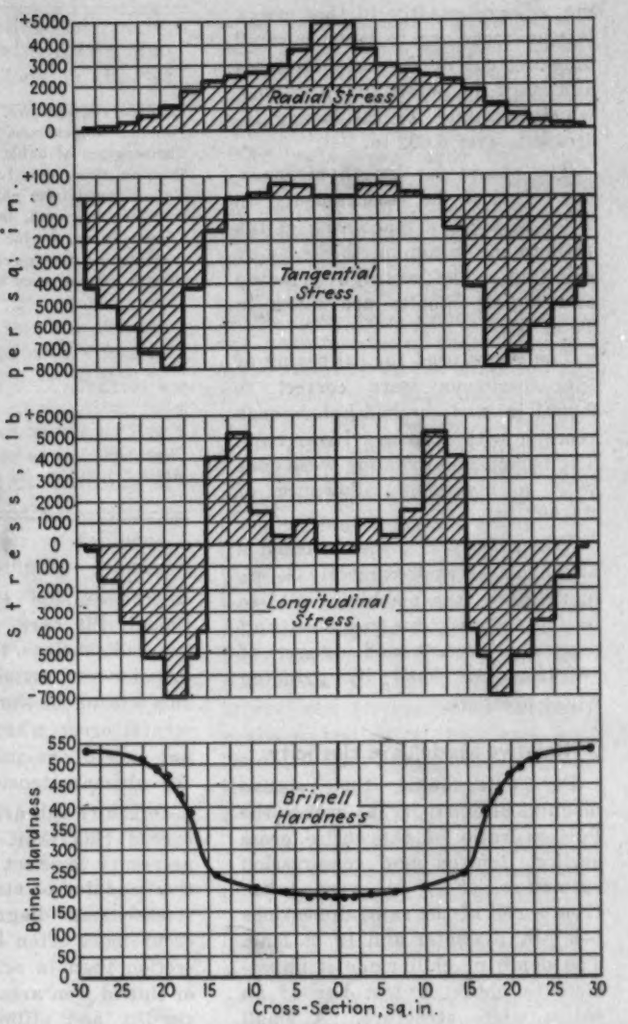


FIG. 4—Relation between modulus of elasticity and section.



ABOVE

FIG. 5—Roll No. 8-1



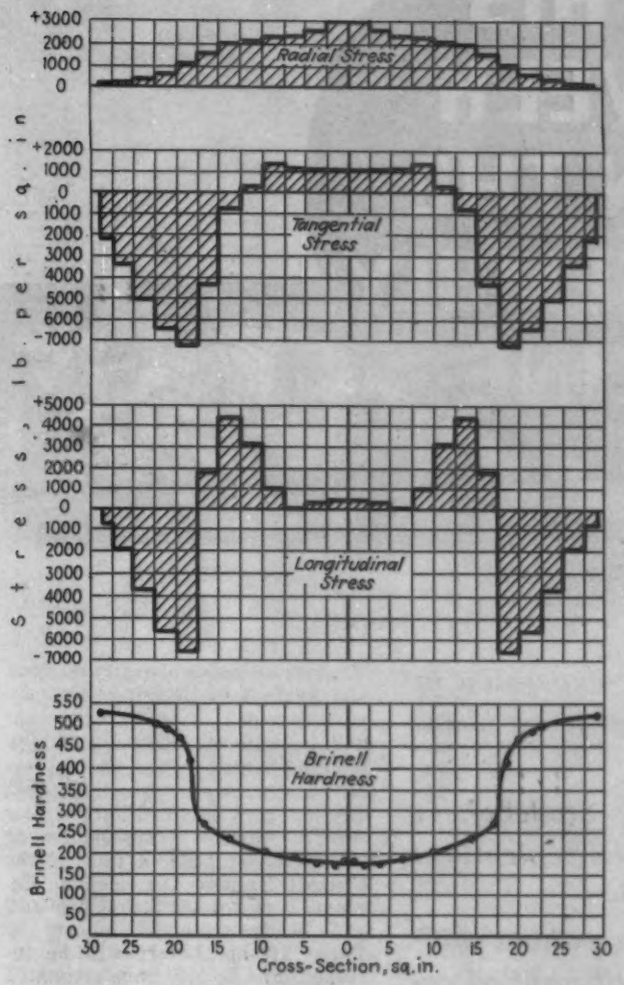
AT RIGHT

FIG. 6—Roll No. 8-2

smallest top neck, could not be properly fed. In all probability the iron in the center of the roll was open but not to the extent noted by visual inspection or during machining. The location of the test piece for Brinell hardness determination and for metallographic inspection, taken from the bottom of the roll, did not indicate this condition, neither did the compression specimen, which in this case was machined above ⅝ in. from the center of the roll (Fig. 3). When comparing the radial stress of this roll with the other rolls a decrease of the tension stress in the center is outstanding. In the mottled area of all rolls is a point where the tension changes over to compressive forces.

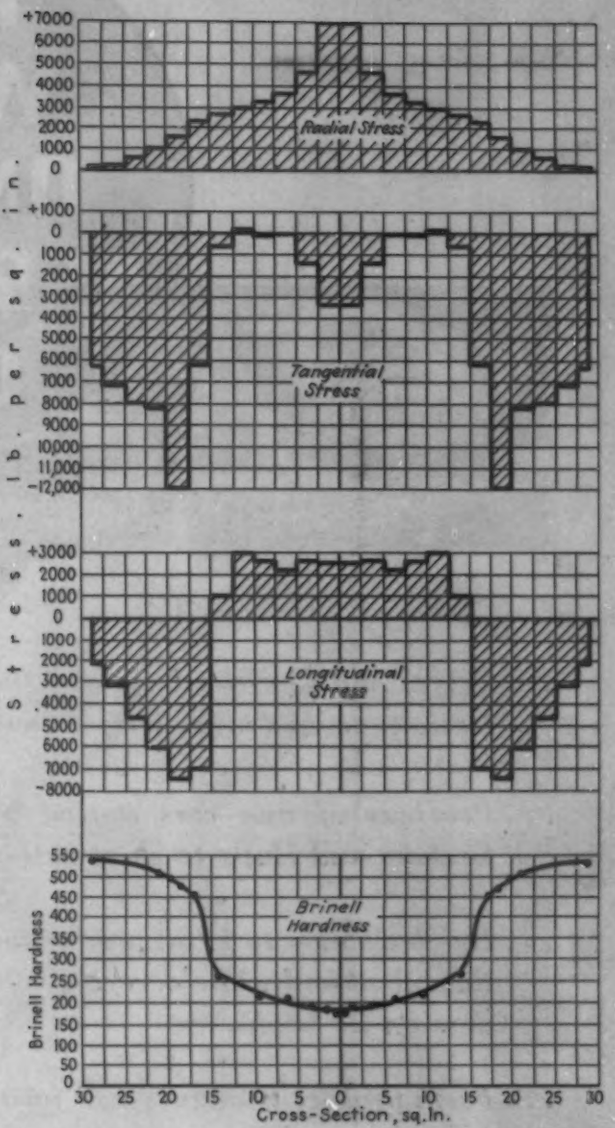
TABLE II.—Results of Grinding and Boring

Diameter of Bore in In.	No. 8-1		No. 8-2		No. 8-3		No. 8-4	
	Length In.	Dia. In.	Length In.	Dia. In.	Length In.	Dia. In.	Length In.	Dia. In.
0	12.9121	8.6221	12.9503	8.6164	12.9689	8.6165	12.9736	8.5798
1	12.9122	8.6221	12.9510	8.6169	12.9698	8.6168	12.9743	8.5803
2	12.9120	8.6221	12.9506	8.6168	12.9692	8.6167	12.9742	8.5803
3	12.9121	8.6223	12.9507	8.6169	12.9693	8.6168	12.9744	8.5804
4	12.9122	8.6225	12.9508	8.6171	12.9697	8.6172	12.9746	8.5806
5	12.9122	8.6224	12.9507	8.6173	12.9692	8.6173	12.9750	8.5809
6	12.9127	8.6231	12.9518	8.6179	12.9700	8.6178	12.9758	8.5815
Thickness of Layer Ground Off								
0	12.9121	6.0076	12.9508	6.0074	12.9692	6.0074	12.9752	6.0071
⅛	12.9119	6.0076	12.9506	6.0075	12.9689	6.0075	12.9752	6.0071
¼	12.9114	6.0077	12.9501	6.0073	12.9684	6.0073	12.9748	6.0070
⅜	12.9105	6.0075	12.9491	6.0072	12.9675	6.0071	12.9743	6.0070
½	12.9105	6.0075	12.9494	6.0075	12.9674	6.0072	12.9743	6.0070
⅝	12.9103	6.0076	12.9491	6.0073	12.9674	6.0073	12.9741	6.0070
¾	12.9101	6.0076	12.9490	6.0074	12.9677	6.0073	12.9743	6.0072
⅞	12.9104	6.0076	12.9484	6.0072	12.9672	6.0072	12.9735	6.0070
1	12.9099	6.0075	12.9485	6.0073	12.9668	6.0071	12.9734	6.0071



ABOVE

FIG. 7—Roll No. 8-3



AT RIGHT

FIG. 8—Roll No. 8-4

The tangential stress has characteristics similar to the longitudinal forces, but the compressive area extending to the change from mottled gray iron and the tension in the middle area are by far less pronounced than is the case in the former stress. The tension force in roll No. 8-4 is practically zero and the compressive stress has a more pronounced maximum than any other roll. The center of this roll is in compression whereas all other rolls at that area have tension.

The radial stress is tension in all rolls. The No. 8-1 roll has the smallest stress and the No. 8-4 roll has the largest, with a considerable increase in the center.

The setting up of the metal in the top neck indicates an effect on the magnitude of the stress in rolls, more so in the center than on the outside. Radial stress will be reduced when the solidification of metal in this part of the roll is retarded.

If the depth of chill is increased the entire mass of the roll of the same dimension will solidify quicker than a roll with a lighter chill; therefore, the maximum compressive stress on the outer zone and tension in the center show a definite increase.

The procedure of making these rolls was selected to obtain minimum stress, nevertheless all rolls showed a considerable amount of stress. If the stress cannot be reduced to a small percentage of the ultimate, it is desirable to have compression on the outer and tension on the inner zone of solid rolls.

Summary

1.—Sachs' method and modified formula are a means of studying stresses of chilled iron rolls without any great difficulty if such stresses do not exceed one-quarter of the ultimate.

2.—If the relative modulus of elasticity does not exceed one-quarter of the ultimate, it will increase from the center of the roll to nearly double on the chilled zone. Tension and compression have the same relative modulus within those limits.

3.—If the relative modulus of elasticity does not exceed one-quarter of the ultimate strength the Poisson ration—one-third—can be calculated.

4.—The stresses are compressive on the surface and tensional within the roll when the rolls are stripped at a very low temperature.

5.—The rate of solidification of the metal in the necks indicates an

(CONTINUED ON PAGE 81)

THIS WEEK ON THE ASSEMBLY LINE

. . . Briggs and Chrysler buy land for expansion in Detroit; ground is broken for Dodge truck plant.

o o o

. . . Previews of new cars started by Studebaker; Graham and Hupp to show early in September.

o o o

. . . Buick changes to 1938 production without shutting plant and while carrying 6000 unfilled orders on its books.

o o o

. . . Farm prosperity augurs well for auto, truck and tractor manufacturers.

DETROIT, Aug. 23.—The Briggs Mfg. Co. last week made its first step toward an expansion program that will put it in the business of manufacturing hardware parts for the automobile bodies it is now building. The company purchased 17 acres of ground from the Hudson Motor Car Co., including a building that has been used as a Hudson export warehouse. Briggs' move follows the collapse of the plan to merge Briggs and Motor Products Corp., the firm from which Briggs has been purchasing most of its body hardware.

At the same time Chrysler, which is cramped for space as its activities increase, has purchased the old Graham-Paige plant along the river front near the Amassador international bridge for $255,000. The plant has been used in the past for storage by Chrysler and it is expected that it will continue to be used as such. Also late in the week Chrysler broke ground on Mound Road between Eight and Nine Mile Roads, north of the city, for the new Dodge truck plant. Macomb County courts today were expected to act on a petition to remove restrictions from the property so it can be devoted to industrial uses. The truck plant will adjoin Rotary Electric Steel Co. property. Rotary, it is understood, is making an investigation which may lead to the installation of another electric furnace smaller than its present one. The addition would provide more capacity if needed, but it is intended principally to give the company more flexibility so it can supply the many special grades of steel for which Detroit manufacturers frequently call. Chrysler a week ago added another 13 acres to its Highland Park plant site without announcing the purpose to which the additional plant will be put. At Kokomo, Ind., a building permit for one of the largest programs ever issued in that city has been obtained by Chrysler for the interior reconstruction of the Davis building, a unit of the former Haynes Automobile Co. plant. It is estimated that $500,000 will be spent to rehabilitate it. Three 250-hp. boilers will be installed, and it has been estimated that 185 carloads of machinery will be moved into the plant.

Plans of Cord Companies

While debate continues on the future of Cord and Auburn in the automotive field, it is learned that further expansion of the Auburn Automobile Co. in the air conditioning field is under way. The company has purchased from the Russell Electric Co., Chicago, the trade name "Aerofan," together with the good will and exclusive patent licenses on the fans formerly manufactured by Russell. The Auburn air conditioning plants in Connersville, Ind., will be devoted to manufacture of a complete line of electric fans, air circulators and other similar units. It is generally reported that L. B. Manning, now in control of the Cord Corp., plans to abandon the manufacture of automobiles and also may leave the shipbuilding field to concentrate on aviation and automotive parts. A decision on a new name for the Cord company is pending. The units which will be affected are the Auburn Automobile, Aviation Corp., Checker Cab Mfg. Co., New York Shipbuilding Corp., Columbia Axle Co. and Lycoming Mfg. Co. Through Aviation Corp., control

extends to the Stinson Aircraft Co., Wayne, Mich. Control of these interests is now held by Manning, his personal associates and a Wall Street banking syndicate headed by Emanuel & Co.

Studebaker Leads Previews

Previews of the new cars will be led off by Studebaker, which is giving the press a chance to inspect its new models today. It is going to be an early season for all the automobile manufacturers and some of the other schedule dates already listed are Sept. 1, Graham-Paige; Sept. 2, Hupmobile; Sept. 13, Buick; Sept. 15, Oldsmobile. Graham-Paige has managed to keep all its plans very quiet but everybody is looking for something startlingly new because Graham, which has been a consistent leader in presenting new developments to the public, has had its engineering staff busy all year working up new plans.

Buick's changeover to its 1938 production is being made with 6000 unfilled orders still on its books. Setting a pace for the rest of the industry, the management arranged schedules to permit inventories and new shop set-ups without interfering with production. Even in a year when changes are relatively minor, that is a feat of no mean proportions and should smooth out Buick's employment curve for the year to a remarkable degree. It is understood that Buick started more than two weeks ago, closing down one department at a time, taking inventory, shoving new tools and machines into line and reopening again, sometimes within a few hours, to produce 1938 parts. Sub-assemblies are said to be already under way using 1938 parts, and certainly before the first of September, the 1938 Buicks ought to be rolling off the assembly line.

Decline in Production

Seasonal influences are making themselves felt on production, with the result that there was a decline of approximately 10,000 units from the assembly figures reported a week ago. Last week's output was reported at 93,339 passenger cars and trucks in the United States and Canada, compared with 103,250 the week previous and 71,935 in the corresponding period of 1936. As pointed out by Ward's Automotive Reports, the industry is maintaining its gain over a year ago, indicating that, despite the fact that the season is well advanced, demand for new cars is holding up. The prime factor in the decline, Ward's said, was the fact that some General Motors divisions, including Buick, Pontiac, Oldsmobile and Cadillac-La Salle, have completed their 1937 schedules. Ford production held firm but some decline was noted at Chrysler. The General Motors figures for the last week are 32,954, compared with 41,865 the week previous and 25,750 a year ago. Chrysler's volume, according to Ward's, totalled 26,600 against 26,900 the week previous and 16,950 a year ago. Ford again put out 26,000 units and this

ESTIMATED U. S. RETAIL SALES OF ALL CARS AND TRUCKS

	Thousands of Vehicles						Per Cent Sold on Instalments			Used Sold, Per Cent of New
	Total Sold			Sold on Instalments						
Year	New	Used	All	New	Used	All	New	Used	All	
1919	1,851	1,087	2,938	1,201	484	1,685	64.9	44.5	57.3	58.7
1920	2,057	1,337	3,394	1,267	636	1,903	61.6	47.6	56.1	65.0
1921	1,553	1,093	2,646	992	554	1,546	63.9	50.7	58.4	70.4
1922	2,414	1,663	4,077	1,538	858	2,396	63.7	51.6	58.8	68.9
1923	3,798	2,598	6,396	2,469	1,434	3,903	65.0	54.8	61.0	68.3
1924	3,312	3,021	6,333	2,332	1,734	4,066	70.4	57.4	64.2	91.2
1925	3,569	3,526	7,095	2,434	2,214	4,648	68.2	62.8	65.5	98.8
1926	3,614	3,231	6,845	2,331	2,107	4,438	64.5	65.2	64.8	89.4
1927	2,951	3,497	6,448	1,712	2,224	3,936	58.0	63.6	61.0	118.5
1928	3,481	4,073	7,554	2,022	2,476	4,498	58.1	60.8	59.5	117.0
1929	4,407	5,350	9,757	2,684	3,461	6,145	60.9	64.7	63.0	121.4
1930	3,036	4,654	7,690	1,855	3,006	4,861	61.1	64.6	63.2	153.3
1931	2,222	3,791	6,013	1,395	2,290	3,685	62.8	60.4	61.3	170.6
1932	1,277	2,374	3,651	697	1,116	1,813	54.6	47.0	49.7	185.9
1933	1,740	3,097	4,837	988	1,759	2,747	56.8	56.8	56.8	178.0
1934	2,293	3,671	5,964	1,247	2,126	3,373	54.4	57.9	56.6	160.1
1935	3,255	5,136	8,391	1,888	3,215	5,103	58.0	62.6	60.8	157.8
1936	4,016	6,590	10,606	2,446	3,855	6,301	60.9	58.5	59.4	164.1

Tough taps

that are ACCURATE

Pratt & Whitney taps include all kinds, and all sizes, small and large. Most are carried in stock for quick delivery. For complete details write to Pratt & Whitney, Division Niles-Bement-Pond Co., Hartford, Conn.

If you could look inside a Pratt & Whitney tap you would see its excellent tough structure, metallurgically correct to resist rough treatment. That is why a Pratt & Whitney tap does not break easily, and keeps going where others fail. It cuts smoothly because its tooth edges are sharp and hard, with just the right relief. Those edges stay sharp a long time, and cut more accurate threads than you would think possible.

The reasons for such excellent performance lie in careful steel selection and heat treatment. A P&W tap may look like any other, but it has a hard, tough accuracy that makes it outstanding. Its fine characteristics are produced by experts.

The real test of any tap is its initial cost divided by the number of holes it will tap accurately. That cost per tapped hole is the only true index of its worth. And with Pratt & Whitney taps, that cost per hole will be low — so low that you will wonder at it.

PRATT & WHITNEY

figure compared with 21,250 a year ago. Chevrolet probably has two weeks left on its production schedules and will close early in September.

Estimates on July passenger car sales have just been received from R. L. Polk & Co. It is indicated that July sales will be 4.41 per cent higher than June, with the total reaching 365,000. Truck and commercial car sales are running 13.51 per cent higher than in June.

Farm Market for Small Trucks

In the small truck field, investigation shows, a real farm market exists. Truck purchases in 1935 in communities of 10,000 and less amounted to 259,491 units. The following year farm income rose less than a half billion dollars and truck purchases rose 44,793 units. In 1937 the farm income is expected to exceed 1936 by a billion and a half. This, combined with the growing tendency toward farm mechanization, should create an outlet for an additional 150,000 trucks. Another factor pointing to fertility of the farm markets for truck sales is found in the 1930 agricultural census. That report showed only 14.3 trucks per 100 farms. The trend to motorized farms undoubtedly has raised this figure considerably, but the slow increase in farm income, until the present year, has limited the market.

One of the automobile companies has made an interesting study of passenger car registrations in the low-priced class in rural towns. It was shown that 52.4 per cent of the population of the United States lives in communities of less than 10,000 population. Almost all of this 52.4 per cent derives its income from the farm, either directly or indirectly. Because politics and Nature seem to have combined to deal agricultural prosperity some blows, this half of the population has for some years been unable to buy its share of automobiles produced. Thus from 1932 to 1936 inclusive, the purchases were at a low level, as shown in the table below. The significant part of the table, however, is in the 1926 and 1927 figures, which show that the rural population, given prosperity, will buy more than its share of the cars produced.

Passenger Car Community Registrations in the Low Price Class ($1000 or Less) in Rural Towns as a Percentage of Total

1926	54.4%
1927	53.9%
Figures incomplete for 1928-31	
1932	41.1%
1933	38.7%
1934	41.7%
1935	43.1%
1936	41.8%
1937 (first quarter)	40.3%

The statistician who made this study believes that the recessions in the last year or so are partly attributable to drought and partly to the cessation of Federal bounties to farmers.

In the purchase of trucks the rural population is a still more important factor. The indication is that while this 52.4 per cent of the population commonly buys a little more than 50 per cent of the passenger cars produced, it buys at least 60 per cent of the trucks produced. Because the farm truck market has been pent up by the depression and subsequent hard luck on the farm, it is probable that truck sales will climb to new levels in the next year. An indication of the ratio between passenger car and truck sales in rural communities is given in the following table, which was produced by the same automobile company expert. It is to be noted that the price class studied here is $750 and under.

Passenger Car and Truck Community Registrations in the Lowest Price Class (Less than $750) in Rural Towns as Percentage of the Total

	Passenger	Trucks
1935 total	1,956,736	466,521
Rural	919,998	259,491
Per cent of total	47.0	55.6
1936 total	2,296,950	536,937
Rural	1,057,920	304,284
Per cent of total	46.1	56.6
1937 total (half)	557,311	129,730
Rural	248,502	70,474
Per cent of total	44.6	54.3

Similarly, tractor sales are bound to climb to untouched heights. Here in Detroit, where Graham-Paige within the past month began assembling 10 tractors a day, production has been stepped up to 25 a day and higher production is anticipated.

Still on the question of automotive markets, the Automobile Manufacturers Association points out that foreign demand accounted for 376,465 sales of passenger cars and trucks in the first six months of this year, a gain of 28 per cent over the same period last year. Demand for passenger cars totaled 247,199 units, an increase of 24 per cent, with the Union of South Africa, Australia and Belgium occupying the first three important market positions. Truck sales numbered 129,266 units, an increase of 36 per cent, with Japan as chief purchaser, followed by Belgium, Mexico and Argentina.

Due to the shortage of scrap iron in Malaya caused by Japanese purchases, coupled with the prevailing higher prices, legislation has been enacted prohibiting scrap export from the Federated Malay States, according to a report received by the Bureau of Foreign and Domestic Commerce from American Trade Commissioner Harold D. Robinson, Singapore.

A MILLION fenders a year pass through Pontiac's bonderizing department. These rear fenders are on the way from the washer to the bonderize spray booths. Conveyors play an important part in the rust-proofing process because sheet metal parts should not be handled in the time between cleaning and bonderizing. The spray booths are considerably more than 100 ft. long in the Pontiac plant.

Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	July 1937	June 1937	July 1936	Seven Months 1936	Seven Months 1937
Raw Materials:					
Lake ore consumption (gross tons)[a]	5,236,487	4,639,733	3,826,050	23,123,350	34,610,446
Coke production (net tons)[b]	.....	.....	3,828,548	25,123,848	.....
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	3,498,858	3,107,506	2,594,268	16,122,494	23,205,451
Pig iron output—daily (gross tons)[c]	112,866	103,584	83,686	75,692	109,460
Castings:					
Malleable castings—production (net tons)[d]	.....	54,026	44,413	318,505	.....
Malleable castings—orders (net tons)[d]	.....	43,141	41,031	306,086	.....
Steel castings—production (net tons)[d]	.....	101,239	78,654	420,236	.....
Steel castings—orders (net tons)[d]	.....	71,817	74,001	497,555	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	4,556,596	4,183,762	3,914,370	25,190,467	33,321,229
Steel ingot production—weekly average (gross tons)[e]	1,030,904	975,236	885,604	827,817	1,100,074
Steel ingot production—per cent of capacity[e]	78.49	74.46	67.61	63.20	83.75
Finished Steel:					
Trackwork shipments (net tons)[e]	8,252	9,194	6,216	40,808	62,260
Fabricated shape orders (net tons)[g]	.....	169,792	188,053	938,724	.....
Fabricated shape shipments (net tons)[g]	.....	140,125	147,824	825,238	.....
Fabricated plate orders (net tons)[d]	.....	34,833	60,324	289,806	.....
U. S. Steel Corpn. shipments (tons)[h]	1,186,752	1,268,550	950,851	5,982,201	8,801,026
Ohio River steel shipments (net tons)[i]	163,705	147,100	110,495	576,116	821,395
Fabricated Products:					
Automobile production, U. S. and Canada[k]	456,775	521,139	451,206	3,045,714	3,374,195
Construction contracts, 37 Eastern States[l]	$321,602,700	$317,842,100	$294,734,500	$1,532,075,300	$1,815,253,900
Steel barrel shipments (number)[d]	.....	929,536	752,223	4,597,984	.....
Steel furniture shipments (dollars)[d]	.....	$2,183,481	$1,510,716	$10,722,134	.....
Steel boiler orders (sq. ft.)[d]	.....	719,008	1,109,849	5,771,466	.....
Locomotive orders (number)[m]	3	22	9	131	231
Freight car orders (number)[m]	1,030	528	4,469	31,023	46,120
Machine tool index[n]	171.1	191.8	150.1	†132.6	†190.5
Foundry equipment index[o]	204.0	228.2	159.6	†155.4	†224.7
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	44,771	47,940	367,085	.....
Imports of pig iron (gross tons)[p]	.....	7,541	12,496	110,003	.....
Imports of all rolled steel (gross tons)[p]	.....	24,656	19,638	143,406	.....
Total iron and steel exports (gross tons)[p]	.....	826,534	296,738	1,928,329	.....
Exports of all rolled steel (gross tons)[p]	.....	195,676	93,365	626,855	.....
Exports of finished steel (gross tons)[p]	.....	163,689	83,599	570,913	.....
Exports of scrap (gross tons)[p]	.....	514,651	192,817	1,243,090	.....
British Production:					
British pig iron production (gross tons)[r]	729,300	699,300	665,600	4,414,700	4,740,300
British steel ingot production (gross tons)[r]	1,059,200	1,106,400	974,100	6,718,300	7,397,600
Non-Ferrous Metals:					
Lead production (net tons)[s]	45,496	40,156	39,576	263,591	299,630
Lead shipments (net tons)[s]	47,727	42,710	38,996	254,733	360,367
Zinc production (net tons)[t]	49,181	50,526	45,481	299,213	329,771
Zinc shipments (net tons)[t]	49,701	50,219	41,819	294,306	369,165
Deliveries of tin (gross tons)[v]	4,980	6,645	7,120	44,140	49,415
Copper production, refined (net tons)[w]	79,611	86,016	53,985	410,165	567,076

* Preliminary. † Three months' average.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [g] American Institute of Steel Construction; [h] United States Steel Corp.; [i] United States Engineer, Pittsburgh; [k] When preliminary from Automobile Manufacturers Association—Final figures from Bureau of Census. [l] F. W. Dodge Corp.; [m] *Railway Age;* [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange; [w] Copper Institute.

The Iron Age Weekly Index of Capital Goods Activity

(1925-27 = 100)

Last week	104.9	Same week 1934	46.9
Preceding week	106.0	Same week 1933	58.6
Same week last month	95.3	Same week 1932	32.5
Same week 1936	90.8	Same week 1931	57.2
Same week 1935	63.5	Same week 1930	85.3
Same week 1929	121.2		

ACTIVITY in the production and distribution of durable goods showed a loss of 1.1 points for the week ended Aug. 21, according to THE IRON AGE seasonally adjusted index. The decline may be accredited to the reduction in steel ingot production, heavy engineering construction awards and car loadings. Although automobile production was considerably under that of the preceding week, the loss was less than normal and the seasonally adjusted figure for this factor rose 0.4 points. Lessened industrial activity in Pittsburgh was offset by a gain in originating shipments in that area, causing the composite figure to gain 0.2 points. These gains, however, were not sufficient to counterbalance the losses in the other factors of the index.

	Latest Week	Change from Preceding Week
Steel production (per cent of capacity)	83.0	—1.5
Automobile production (number of cars and trucks)	93,339	—9,911
Railroad loadings of forest products (number of cars)	40,932	—212
Pittsburgh industrial production and shipments (index number)	105.3	+0.2
Construction contracts awarded (total value)	$43,341,000	—$2,007,000

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Ward's Automotive Reports; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District, from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

WASHINGTON. C

. . . Government's shipbuilding program blocked by CIO activities — Chairman Kennedy says labor strife is assuming "really serious proportions."

o o o

. . . Warring factions headed by Green and Lewis believed to be in for a long drawn-out fight; Green appears to be in Roosevelt's favor at the moment.

o o o

. . . National Bituminous Coal Commission comes in for press criticism for alleged prodigality in salaries for experts, said to be $30,000 a year.

o o o

. . . 75th Congress appropriation $9,400,000,000 before adjournment: large sum given to CIO-dominated Labor Relations Board.

o o o

By L. W. MOFFETT

Resident Washington Editor
The Iron Age

o o o

WASHINGTON, Aug. 24—The John L. Lewis drive for CIO supremacy in the maritime and shipbuilding unions is blocking the Maritime Commission's initial steps to build up the U. S. Merchant Marine. Chairman Joseph P. Kennedy has directed the tentative program be shelved for at least two months while the commission studies, among other things, the "unsettled labor situation" which, he says, is assuming "really serious proportions."

Kennedy points out that no one is going to invest in an industry which is subject to "such costly and prolonged interruptions as those which have characterized shipping during recent years." The five experts who have been named to canvass the entire shipping situation in all its phases before the commission attempts to set up any long-range program will view the "labor situation" with "special scrutiny."

What steps will be taken as a result of the "study" is not known but it is not considered unlikely that Skipper Kennedy, a close adviser of the President, may sooner or later lay the CIO-aggravated martime labor issue on the White House doorstep, a step which would widen the rift believed to exist between Lewis and the President.

Authorized to spend about $300,000,000 on a new ship subsidy program, the Maritime Commission made tentative plans to build 95 ships at a cost of approximately $256,440,000, and estimated to require about 280,000 tons of steel. Abandonment of these plans came about a month after Lewis launched his energetic organization drive in the maritime field.

Although the problem of building up an adequate Merchant Marine presumably was thoroughly surveyed by the old U. S. Shipping Board, the Merchant Fleet Corp., and by former Congressional investigations, the present commission says the labor situation is not the only problem harassing it. But there seems little doubt that the Maritime Commission, like industry in general, has discovered the handicap of having the irresponsible CIO boys around trying to rule the roost "or else."

Organizing Shipyard Workers

Disregarding his defeat in the steel industry, Generalissimo Lewis embarked on a drive in July to make his CIO the dominant factor among maritime and shipbuilding workers. In his announced intention of gunning for the existing A. F. of L. leadership, one of his first moves was to name Harry Bridges, avowed communist, said to be in this country illegally, to head his organization drive on the Pacific Coast.

It was Bridges' union, it is recalled, which launched the strike of last fall that paralyzed West Coast shipping for three months. The strike recently settled tem-

DOWN time is costly . . . continuous service is essential to profitable production in the steel mill.

CINCINNATI Precision Roll Grinding Machines, always ahead in design and operating features, are naturally ahead in production.

Cuts from the heaviest roughing of chilled alloy iron rolls to the most sensitive finish and accuracy cuts are taken by these fine machines. Above you see a CINCINNATI Roll Grinder finishing a large roll to exacting precision limits and superfine finish. And the factory bearing adjustments not only remain the same from one setting to another, or from day to day, but from year to year.

CINCINNATI Roll Grinding machines will keep rolls always ahead of production. Write for illustrated Booklet and Specifications G-383.

CINCINNATI

CINCINNATI GRINDERS INCORPORATED

CINCINNATI, OHIO, U. S. A.

porarily in New York City was the direct result of the Green-Lewis battle and crippled more than $30,000,000 worth of shipbuilding and repair work for a two-month period. Other labor disputes in that field are due to break out at almost any time. There is real cause for the Maritime Commission to be apprehensive over the success of its program under such conditions.

Incidentally, barring unforeseen developments, this labor feud raging between Green and Lewis is expected to continue unabated for some time, possibly for a year or two, according to reliable sources in Washington. It is contended that when two "prima donnas" of the type under question, working 180 degrees out of phase for the purported good of the labor movement, set out to do an organizing job it is well-nigh impossible to stop the thing.

A marked increase in membership is conceded to both camps as a result of the current drives but grave doubts are expressed that the new membership will be permanent in view of the circumstances under which it is making these rapid strides.

The chieftains of both camps are expected to continue efforts to seek the good graces of the President. Lewis has criticized the Administration's failure to intervene in the Ohio steel strike controversy, but only indirectly. He may be due for a sharp rebuke for throwing the CIO monkey-wrench into the Government's maritime machinery—but whatever happens, it is believed he can ill afford to stay away from the White House coattails for any extended period.

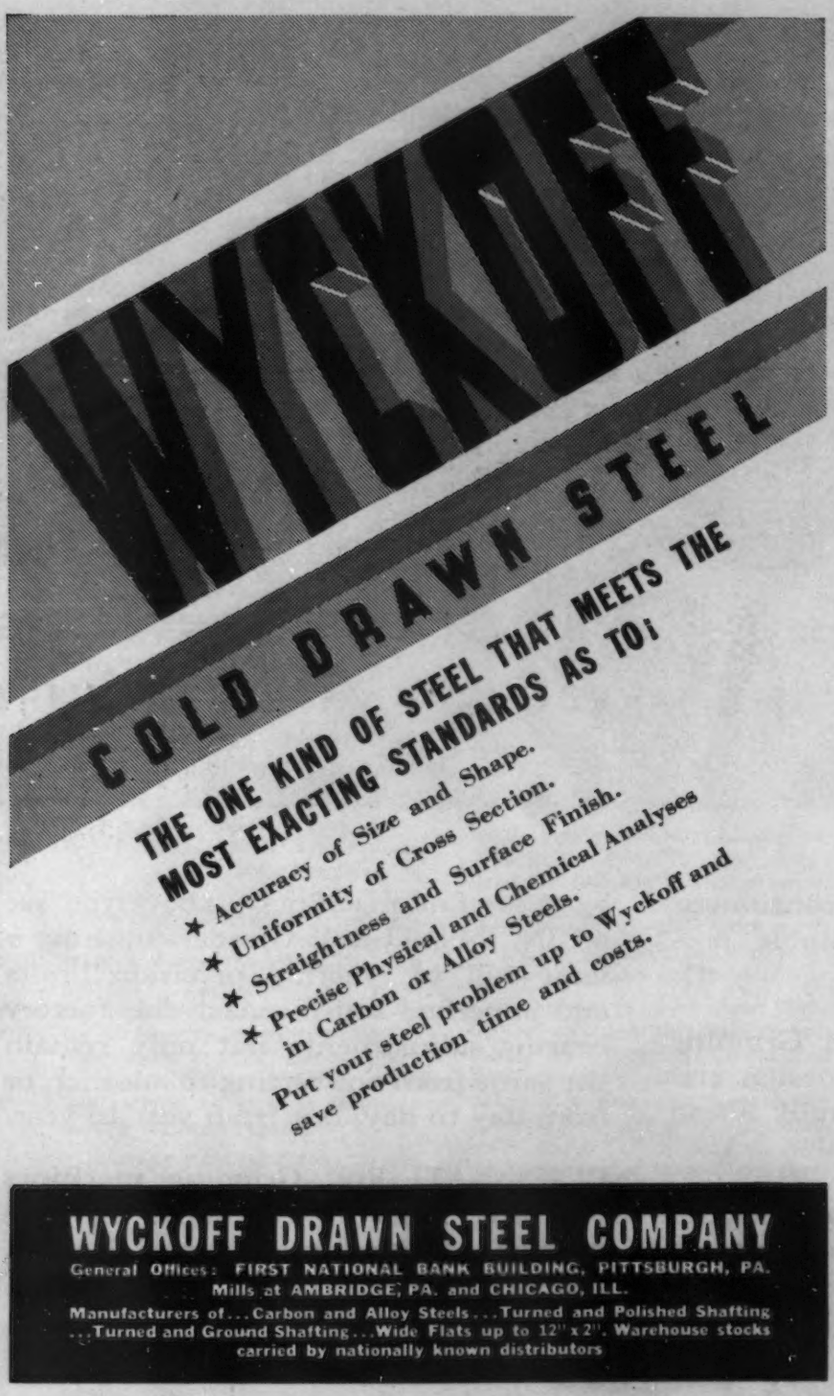
Green or Lewis?

Right now William Green is losing no time in selling the country on the idea that he is standing ace high with Roosevelt. After Green's recent visit to the White House, during which the President approved "in principle" Green's amendments to the ill-fated wages-and-hour bill, Roosevelt ordered them rushed to Capitol Hill for Congressional action. Next day all Washington correspondents received from A. F. of L. headquarters a copy of a dispatch from a Chicago paper which described Green's efforts to amend the bill, and added: "Of great significance, equal to the radical changes wrought in the bill, was the emergence of Green as, in effect, spokesman for the White House in matters affecting labor. President Roosevelt seemed to have administered a rebuke to Green's enemy, John L. Lewis of the CIO, in this controversy."

Bill Green liked that story so well he went out of his way to tell all the newspaper boys about it. Ever since the CIO was born, Green has appeared to enjoy basking in the limelight, particularly where it linked him with the President.

The latest attempt to bring the two warring factions together is the announcement of Senator George L. Berry, of Tennessee, President Roosevelt's former Industrial Coordinator. Berry says he will name Edward McGrady, Assistant Labor Secretary, and a member of the unsuccessful Steel Mediation Board, as a representative to the A. F. of L. convention in Denver in October. McGrady's job, if he accepts, will be to hold secret negotiations with peace-minded A. F. of L. leaders.

Berry, however, has made overtures in that direction before and there is little reason to believe this latest attempt will be successful. Berry and Lewis worked shoulder to shoulder in organizing labor's


WYCKOFF
COLD DRAWN STEEL
THE ONE KIND OF STEEL THAT MEETS THE MOST EXACTING STANDARDS AS TO:
★ Accuracy of Size and Shape.
★ Uniformity of Cross Section.
★ Straightness and Surface Finish.
★ Precise Physical and Chemical Analyses in Carbon or Alloy Steels.
Put your steel problem up to Wyckoff and save production time and costs.
WYCKOFF DRAWN STEEL COMPANY
General Offices: FIRST NATIONAL BANK BUILDING, PITTSBURGH, PA.
Mills at AMBRIDGE, PA. and CHICAGO, ILL.
Manufacturers of...Carbon and Alloy Steels...Turned and Polished Shafting ...Turned and Ground Shafting...Wide Flats up to 12" x 2". Warehouse stocks carried by nationally known distributors

Non-Partisan League, which contributed heavily to the Democratic Party's campaign fund last November, but the two have drifted apart since Berry was given his Senate seat, possibly because of Berry's previous efforts to end the current labor quarrel.

Coal Commission Comes In For Press Criticism

IN Washington, where the political scene dominates and the brain-storms of theorists blossom into flowering bureaus the like of which the country has never known, it is difficult to wade through the complex maze of Governmental agencies and point to one as being more of an offender than another.

But newshawks have recently uncovered a bureau where there appears to be a real need for close public scrutiny. It is the National Bituminous Coal Commission.

This agency, one of the newer bureaus created under New Deal auspices, has the assigned job of stabilizing the soft coal industry for which the Federal Government pays each of its seven members $10,000 annually. But the commission, according to reports, is having a titanic struggle in "stabilizing" its own organization and in protecting itself from its own patronage excesses.

John L. Lewis' henchmen on the coal board have threatened to demand a public investigation of commission activities, particularly the personnel policy which, according to the story, contemplates the appointment of experts on district administrative boards at a yearly salary of $30,000 each.

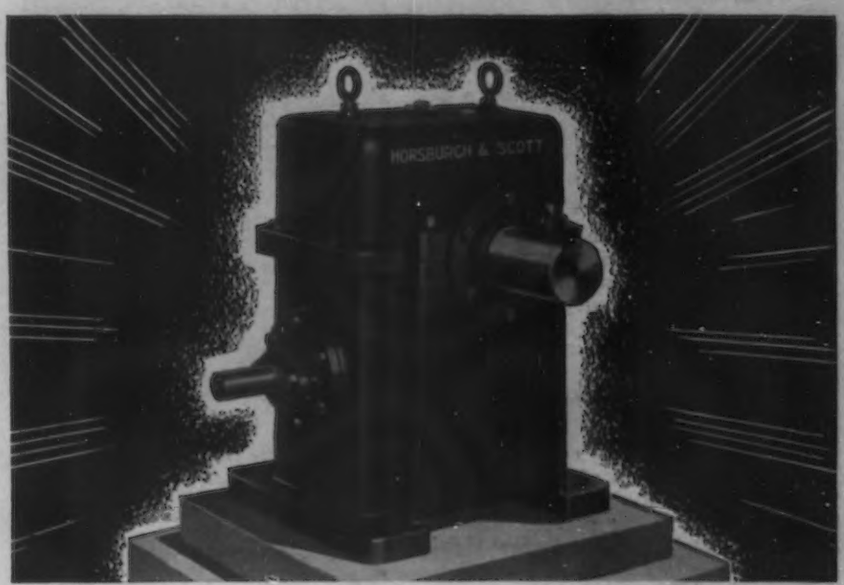
Labor members of the commission, it is said, balked at such a figure although it is not known whether their protests were motivated by a UAW determination to dictate personnel appointments or whether they were prompted by higher motives. At any rate, the upshot was that Chairman Charles F. Hosford, former Pittsburgh coal operator and Harvard law graduate, wrote out his resignation, the acceptance of which was blocked by a three-to-three tie vote by other commission members.

Backing Hosford and voting against accepting the resignation was Commissioner C. E. Smith, West Virginia newspaper publisher, who has functioned as the agency's ace patronage dispenser since 1935. Smith is understood to have his eye on the West Virginia governorship.

In a statement denying the existence of "any patronage rows," Chairman Hosford sought to minimize the story by explaining that "the expenses of district boards are not paid out of Government funds but from assessments levied by the boards upon code member producers." All of which means that the consumers of coal would pay the exorbitant salaries of board employees in the form of increased coal prices. Hosford will have a difficult time convincing anybody that paying the price of patronage excesses through increased coal prices is little better than paying for it through Government taxes.

The chairman insists that harmony reigns throughout the commission. The board, it seems, is just one big, happy family, with each member drawing his $10,000 annually from Federal coffers, and each deeply touched over the plight of the soft coal industry. "Rumors of dissension are grossly exaggerated," the chairman says.

Such information about district board salaries is certainly enlight-



A Marvel of **ENGINEERING AND PRECISION MANUFACTURE**

★ Here's a Worm Gear Speed Reducer with many outstanding features:

1. The worm is a forging of special case hardening steel, normalized, heat treated to refine the core, carburized, hardened and ground all over.
2. The worms are ground to within .001" in lead, indexing and contour.
3. Both shafts are mounted on oversize anti-friction bearings.
4. The gear teeth are generated by a hob which is an exact duplicate of the worm.
5. The housing has heavy external ribbing for adequate worm and gear bearing support.
6. A specially designed splash oiling system provides complete lubrication for all bearings, even at very low gear speeds.

Your Company Letterhead brings a Complete 448-page Catalog

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

ening, coming as it does at a time when the commission has under consideration the question of exercising jurisdiction over captive mines. If included under the code, presumably the captives would have to pay tribute to the upkeep of district boards including, of course, such salary figures as may be dictated by a group of politicos in Washington.

Congress Appropriated $9,400,000,000

SHOVING aside all pretext of economy, the 75th Congress, which consistently dodged the tax issue throughout the session, made appropriations totaling $9,400,000,000—an amount which would have run the Government for at least 10 years during the pre-war period. It represents an increase of $1,290,000,000 over the amount appropriated by the 74th Congress, excluding the soldiers' bonus.

Disregarding the advice of its appropriation committee, the House voted substantial additions to the third deficiency bill and the Senate followed suit. These additional sums included $1,735,000 for the CIO-dominated Labor Relations Board, an amount over and above its present total of $785,000.

When the House committee announced approval of only $867,500 for the board, Labor's Non-Partisan League, the political mouthpiece of John L. Lewis, grew highly incensed and started its lobbyists working overtime to correct this "serious mistake." No other national problem presents "so serious a threat to domestic peace as does the failure to guarantee the civil rights of American workers, the league said in a widely-circularized propaganda sheet.

Senator Robert F. Wagner, father of the law, likewise urged the committee to increase the allocated funds for the board. The pressure groups closed in and the House capitulated, doubling the amount recommended by the committee. Testimony before a subcommittee a few days earlier revealed that the board also was seeking approval of a $15,000 deficiency incurred during the past fiscal year. It developed that the board was so swamped with CIO orders that it did not know it was spending more money than had been appropriated. "We are enormously embarrassed by the deficit," declared Board Chairman J. Warren Madden, who cited the favorable Supreme Court decision as an excuse.

THEN there appeared in Washington last week another pressure group consisting of 2000 WPA marchers led by Comrade David Lasser, of the Workers' Alliance. Camping in the shadow of the Washington Monument, they were out to urge passage of a resolution pending on Capitol Hill which would continue their WPA jobs indefinitely.

After Congress had refused to appropriate the huge sum asked by Harry Hopkins, the kingpin of the money spenders, they were laid off from their WPA jobs, victims of a benevolent Government which set out to preach the doctrine of the more abundant life without first computing the costs. Caught in the retarding undertow of habit, once they had accepted Government assistance, they grew to depend more and more upon Federal relief, and less and less upon their own initiative. Now both they and the Government are paying the costs.

JOSEPH P. KENNEDY, chairman of the Maritime Commission, who has delayed U. S. shipbuilding program because of CIO labor agitation.

Soft Coal Prices to Be Effective Oct. 1

WASHINGTON, Aug. 24.—The soft coal commission expects minimum prices on coal to be made effective by Oct. 1 or "well before the autumn peak in coal purchasing is reached," according to a commission statement.

The commission has directed all district boards east of the Mississippi, except the Alabama fields, to propose minimum prices on the basis of a weighted average cost of production set tentatively at $2.22 a net ton in Price Area 1 and $1.88 in Price Area 2.

Proposed prices are due in Washington by Sept. 2. Prices will be "coordinated" at a hearing on Sept. 27. Minimum prices will become effective promptly after the hearing, the commission said.

Navy Asks Bids on High Tensile Steel

WASHINGTON, Aug. 24.—The Navy Department has asked for bids for supplying 114 tons of high tensile steel plates and disks for 34 gun shields and carriages. Bids will be opened on Sept. 4. Contracts awarded will call for delivery of material within 30 days of order to the Washington Navy Yard.

Farley Now Demands Regularity of Mails

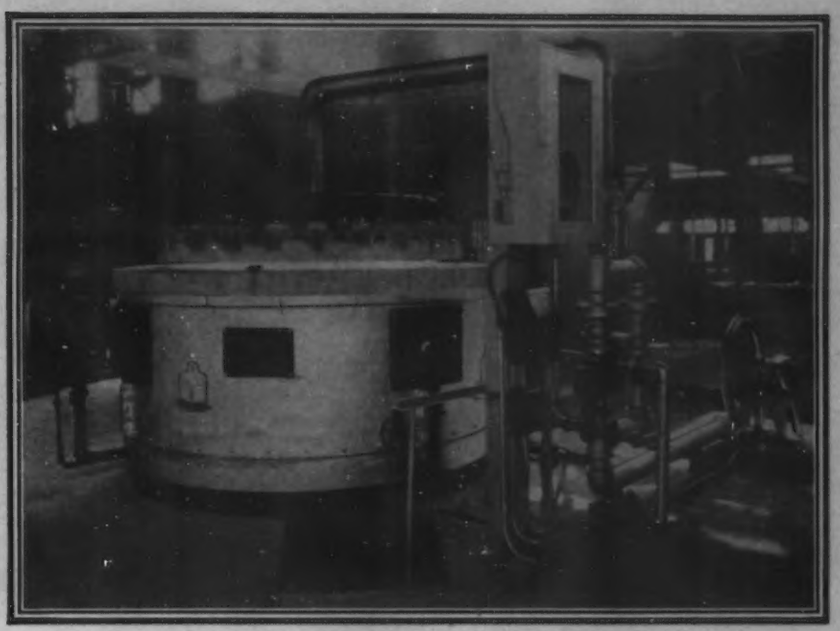
WASHINGTON, Aug. 24.—From Maine to California, through fair weather and foul, the public has a right to expect "punctual and uniform mail deliveries" and the first duty of postal employees is to see that "mails are safeguarded, that dispatches and deliveries are prompt and regular."

Postmaster General James A. Farley said so himself the other day while addressing a convention of postmasters down in Fayetteville, N. C. It was Farley's first statement on mail deliveries made publicly since the Ohio strike episode when CIO pickets blocked mail shipments resulting in a Senate investigation. The Senate committee refused to summon Farley for questioning.

"Regularity of service is most important," Farley told the convention. "The department insists on performance based on rigid schedules. The public has a right to expect punctual and uniform deliveries. Of course, there are occasional delays due to unforeseen transportation difficulties caused by storms and wrecks, but these interruptions are relatively few, and under such conditions the public is most tolerant."

The Postmaster General laid down no suggestion covering "unusual mail," and remained silent on how to cope with CIO pickets.

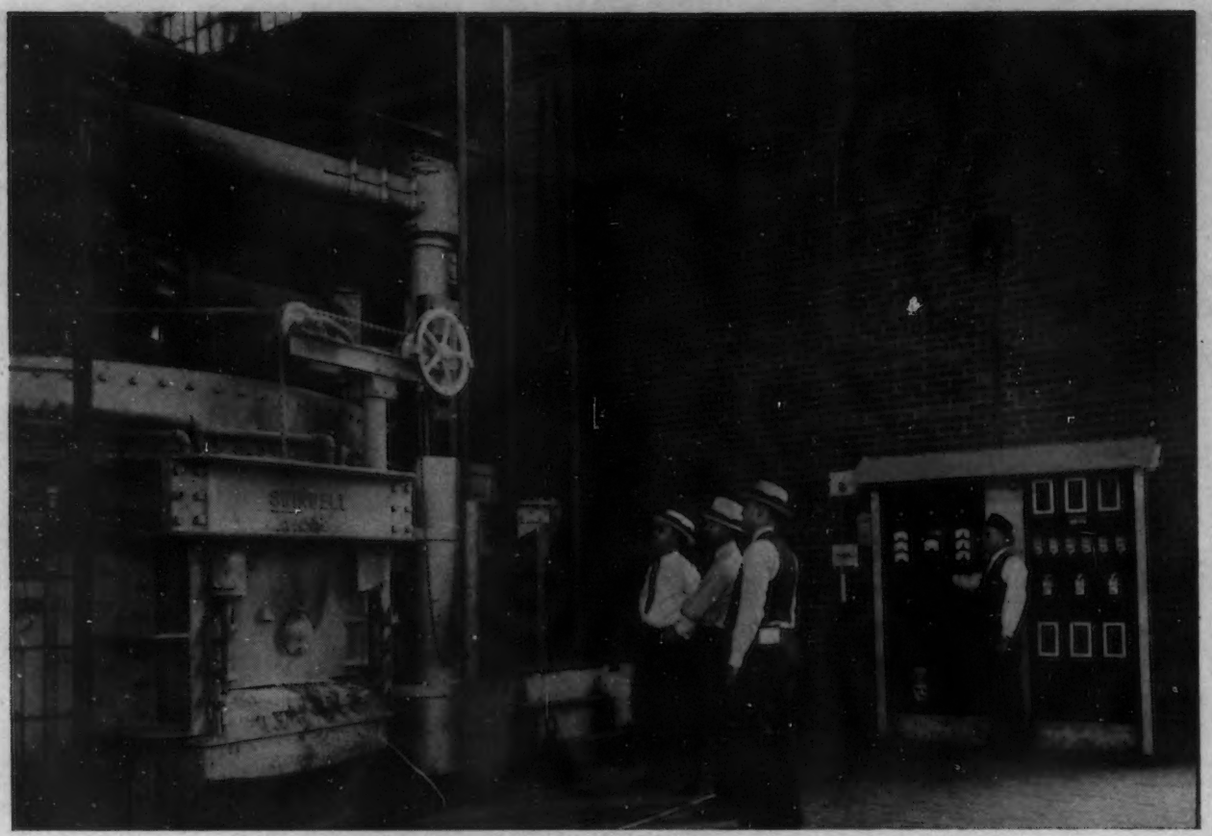
COMBUSTION EQUIPMENT



Rotary furnace built by the Electric Furnace Co. of Salem, Ohio, for heating ends of stock preparatory to upsetting operation.

By NORTH AMERICAN

North American
Manufacturing Company
CLEVELAND · OHIO



Allegheny Steel Co.'s new 25-ton electric furnace being inspected by the plant executives. They are (left to right) Walter Patterson, superintendent electric furnace department; Carl Polloch, general superintendent of plant; Russell Allen, assistant sales manager, and W. A. Givens, general manager.

Allegheny Steel's New Electric Furnace Starts Operating

ALLEGHENY STEEL CO., Brackenridge, Pa., last week put into operation a new, recently installed electric furnace adding 36,000 tons annually to its capacity on high alloy stainless and corrosion-resisting steels.

In the last 18 months the company's steel making capacity has been increased 156,000 tons a year, accounted for by the installation of two electric furnaces and the putting into operation of two open hearth furnaces acquired by the company in 1929. Increases in Allegheny finishing capacity and the acquisition of the West Leechburg plant, where additional equipment was installed, have made the increase in raw steel capacity necessary.

Neutrality Act Would Hit Japan

THE Chinese-Japanese situation has brought about the closing of two of China's chief ports, Shanghai and Tientsin, and has forced American business houses with offices in Shanghai, including the United States Steel Products Co., export subsidiary of the United States Steel Corp., to move to Hong Kong to protect their employees. Ships bound for Shanghai have been re-routed to Hong Kong.

Invocation of the Neutrality Act by the United States would operate chiefly against Japan as shipments to China from this country have already been virtually suspended owing to high insurance rates.

ALLOY HY-TEN STEELS

ALSO POPULAR S.A.E. ALLOY GRADES ● SUITABLE FOR A WIDE VARIETY OF USES

HY-TEN "M" TEMPER

Oil Hardening Alloy Steel

For parts requiring great hardness, density of structure, resistance to wear, combined with toughness.

HY-TEN B NO. 3X

.50 C. High Man.-Chrome-Moly

Machinable in heat-treated condition at hardnesses up to 42 Rockwell "C" (401 Brinell) or even higher.

Warehouses CAMBRIDGE CHICAGO CLEVELAND

WHEELOCK, LOVEJOY & CO., INC.

SEND FOR DATA SHEETS

Warehouses DETROIT NEWARK BUFFALO

WANTED!

More Deep Drawn Stamping Problems to Solve!

That is the part of our business we thoroughly enjoy — the chance to roll up our sleeves and plunge into a new pressed steel problem.

Nothing we would like better than to have your engineers say to us:

"The weight must be reduced"

or

"The finished appearance must be improved"

or

"The cost must be lowered but strength retained"

CAN YOU DO IT IN PRESSED STEEL?

A letter, wire or phone call to any one of our district offices (NEW YORK — PHILADELPHIA — CHICAGO — DETROIT — INDIANAPOLIS — CLEVELAND) or our main office at Alliance, Ohio — will put us to work for you — without obligation.

TRANSUE & WILLIAMS

Designers and Manufacturers of

DEEP DRAWN STAMPINGS

Alliance, Ohio

.PERSONALS..

S. J. SIMMONS, New York district manager of the Aluminum Co. of America for the past nine years, was recently appointed assistant general sales manager. He will make Pittsburgh his headquarters. Mr. Simmons started to work for the Aluminum Co. in 1913 as a general salesman in the Rochester office. Five years later he was sent to South America. It was only three years before he was recalled to become assistant to the president of Aluminum Manufacturers, Inc., Cleveland. In 1923 he was made manager of the Buffalo office, and in 1928 he was transferred to the New York district as manager.

These new cranes travel at 170 feet per minute with a five ton load. They operate over the entire plant area interlocking for passage of hoists from bridge to bridge. Cranes and hoists are propelled by low horse power MonoTractors all from floor control.

These rubber wheel drive units make low-cost handling possible. They have been successfully applied to all overhead trolley equipment with a wide variety of automatic controls. Engineering service is available without obligation.

Write for new book on MonoTractor drive for Overhead Handling

AMERICAN MONORAIL CO

13103 Athens Ave., Cleveland, O.

KARL P. FUHRMANN, formerly manager of the range boiler and tank division of the Wheeling Steel Corp., Wheeling, W. Va., has been appointed general sales manager of William B. Scaife & Sons Co., Pittsburgh. He was graduated from Penn State College in 1913 with an engineering degree. He gained his early experience in the steel industry with the Algoma Steel Co. and with the Erie Forge & Steel Co. Later he worked for 20 years with the Wheeling company, first in the maintenance department, then the operating department for several years and finally in the sales department.

❖ ❖ ❖

S. F. WOLLMAR, formerly of the SKF Hofors mill in Sweden, has been elected president of SKF Steels, Inc., New York, and N. S. PETERSON has been made vice-president.

❖ ❖ ❖

G. H. SHILL has been appointed manager of the plastics department of the General Electric Co., Pittsfield, Mass. The administration of all plastics activities of the company has been consolidated at Pittsfield, and the company's construction materials sales division at Bridgeport has been relieved of the responsibility of plastics sales. K. W. NELSON, formerly manager of automotive products sales in the appliance department, has been appointed sales manager of the plastics department. J. J. LENGYEL has been appointed acting manager of automotive products sales, Bridgeport, and C. E. HAMANN, commercial engineer of the same section.

❖ ❖ ❖

HERBERT C. BEHRENS, assistant chief engineer in charge of engineering of the Duplex Printing Press Co., Battle Creek, Mich., has been appointed chief engineer in charge of engineering, development and research.

❖ ❖ ❖

A. M. MOSLEY has been appointed vice-president and general manager of the Cohoes Rolling Mill Co., Cohoes, N. Y. M. L. JACOB has been made assistant general manager, A. MACFADYEN, vice-president in charge of purchases, W. S. CRAWFORD, vice-president in charge of credits and accounts, and JOHN W. COOPER, sales manager.

❖ ❖ ❖

CARL V. REILLY, of 3537 Antisdale Avenue, Cleveland Heights, Ohio, has been made sales representative for the upper part of Ohio and the city of Buffalo for

the Thermal Products Corp., Pittsburgh.

❖ ❖ ❖

EDWARD P. GEARY has been appointed Midwestern sales manager of the Rustless Iron & Steel Corp., Baltimore, with headquarters at 4013 Milwaukee Avenue, Chicago. Mr. Geary will be in charge of sales in Illinois, Wisconsin, Indiana, Iowa and Missouri. He was formerly Chicago district sales manager for the Colonial Steel Co. The Rustless Iron & Steel Corp. plans to open sales offices in other districts.

❖ ❖ ❖

J. F. LINTHICUM, division sales manager in charge of ingot and ore sales, Aluminum Co. of America, will leave his present position on Sept. 1 to become vice-president, American Lumber & Treating Co., Chicago. Mr. Linthicum has been with the Aluminum Co. since 1913 and is a member of the American Institute of Mining and Metallurgical Engineers. He has been a director of the Chicago firm, to which he goes as vice-president, for the past three years.

❖ ❖ ❖

LOUIS J. BRANN, former governor of Maine, who has been representing the Independent Iron and Steel Producers Committee on Scrap in Washington, has announced that he will be a candidate for the Democratic gubernatorial nomination in Maine in the 1938 primaries.

❖ ❖ ❖

M. W. LADE, Chicago, has been appointed a vice-president and treasurer of Globe-Union, Inc., Milwaukee, manufacturer of storage batteries, radio parts, spark plugs and roller skates. He succeeds W. BALLINGER FYFFE, formerly treasurer, who becomes secretary. T. B. INGALLS resigned as secretary.

❖ ❖ ❖

CLARK M. ROBERTSON, of Milwaukee, has been elected president of the Federal Steel Sash Co., Waukesha, Wis., to fill the vacancy caused by the death of Charles J. McIntosh on July 22. Mr. Robertson was personal attorney for Mr. McIntosh for many years and represents his estate. R. E. HUPPERT, secretary and treasurer of the Federal company, has been given the added duties of general manager.

❖ ❖ ❖

RUSSELL SCHULTZ, the new assistant master mechanic in Chevrolet's new Buffalo plant, joined the Chevrolet organization as an apprentice in the toolroom at the gear and axle plant in Detroit in 1920. From there he went to the tool design department, the die design department, and then was appointed assistant foreman of the tool design department. In 1933, Mr. Schultz was named chief tool designer in the gear and axle plant. His promotion to the position of assistant master mechanic of the new Chevrolet plant at Buffalo came in July, 1937. He is a son of OTTO SCHULTZ, the master mechanic of the gear and axle plant in Detroit. The new plant at Buffalo, expected to begin operations early in January, will manufacture transmissions and axles, with a capacity of approximately 1800 of each daily.

❖ ❖ ❖

DAVID C. BABCOCK has been appointed representative in the Michigan territory for the Kropp Forge Co., Chicago. He will make his headquarters at 863 Southfield Road, Birmingham, Mich.

CINCINNATI BICKFORD

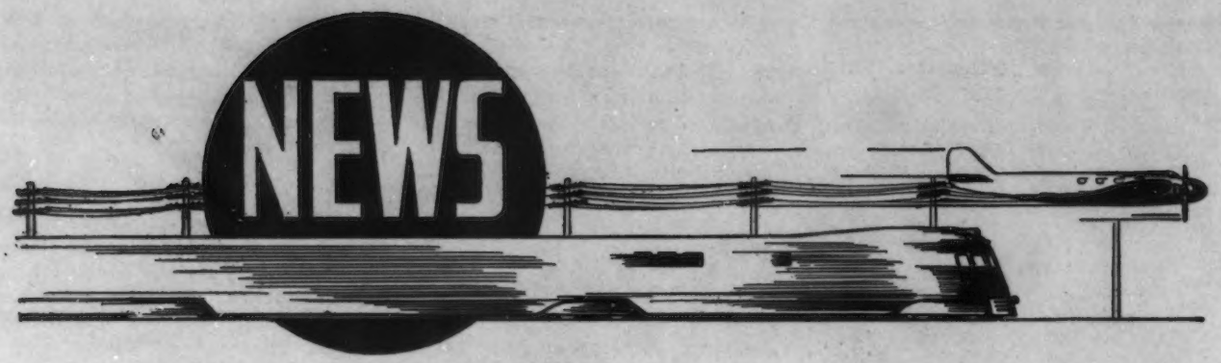
In the drilling and tapping of these centrifugal pump cases, the new High-Speed Super-Service Radial saves approximately 30% in direct labor as compared with previous methods. The Worthington Pump & Machinery Corporation could reasonably predict this saving, for this is their 14th Super-Service Radial at the Harrison, New Jersey, works.

One of their 6′ Super-Service Radials is regularly drilling 1-1/64″ holes in bronze condenser tube heads at the remarkable penetration rate of 42.9″ per minute. This speed is all the more impressive when one considers the rigid manufacturing standards to which Worthington products are held.

The satisfying performance and saving accomplished by the Super-Service Radial in the country's leading plants result from its long lived accuracy and its distinctive convenient control. Every lever is always within easy reach at the operating position.

May we send complete details?

SUPER-SERVICE RADIALS



European Scrap Cartel May Be Extended One Year

LONDON (*Special correspondence*).—The extension for another year of the International Scrap Iron Cartel, which would otherwise expire at the end of 1937, is foreshadowed, and confident rumors to this effect have been published. It is expected that a definite decision will be announced in October.

Market matters, it is understood, form the principal question on the agendas of the technical committee of the Scrap Cartel, which recently met in Paris, and of the managing committee at its meeting in London.

In Britain an extension of the cartel is felt to be necessary owing to the continued increase in iron and steel production. The July figures, just issued, show that the output of pig iron made a further sharp advance to the highest figure for nearly 17 years. Production amounted to 729,300 tons, compared with 699,300 tons in June, and constituting the highest monthly figure since September, 1920, when output was 741,000 tons.

But for the incidence of holidays in Scotland, steel output, which was 1,059,200 tons, would also have established a new high record. This figure compares with 1,106,400 tons in June and 974,100 tons in July last year.

In comparing the figure for last month with that of Sept., 1920, the changes in practice in the interval must be taken into consideration. At that time a much higher charge of pig iron was customary in British steel making. Since then the utilization of scrap has expanded substantially and the proportion of pig iron has fallen.

Steel output, at 1,059,200 tons, was only 50,300 tons below the peak total of 1,109,500 tons reached last March. As a result of the Coronation holidays in Scotland, the output in that country fell by 53,000 tons from the June figure. Had there not been this recession, therefore, a slight increase on the existing high record would have been established.

Meanwhile, the national scrap iron campaign is being continued with increased energy. During August two representatives of the British Iron & Steel Corp. made an aerial tour of the country. They flew to 20 industrial centers, including Leeds, Middlesbrough, Glasgow, Belfast, Manchester, Birmingham, and Swansea, where there are headquarters of the scrap merchants' associations, their object being to check up on the progress of the campaign. Another object was to explore the opportunities available for voluntary collectors of scrap to take part in the campaign. A large number of private individuals had offered to assist, and the aim of the corporation is to coordinate their activities so as not to encroach upon the livelihood of small dealers.

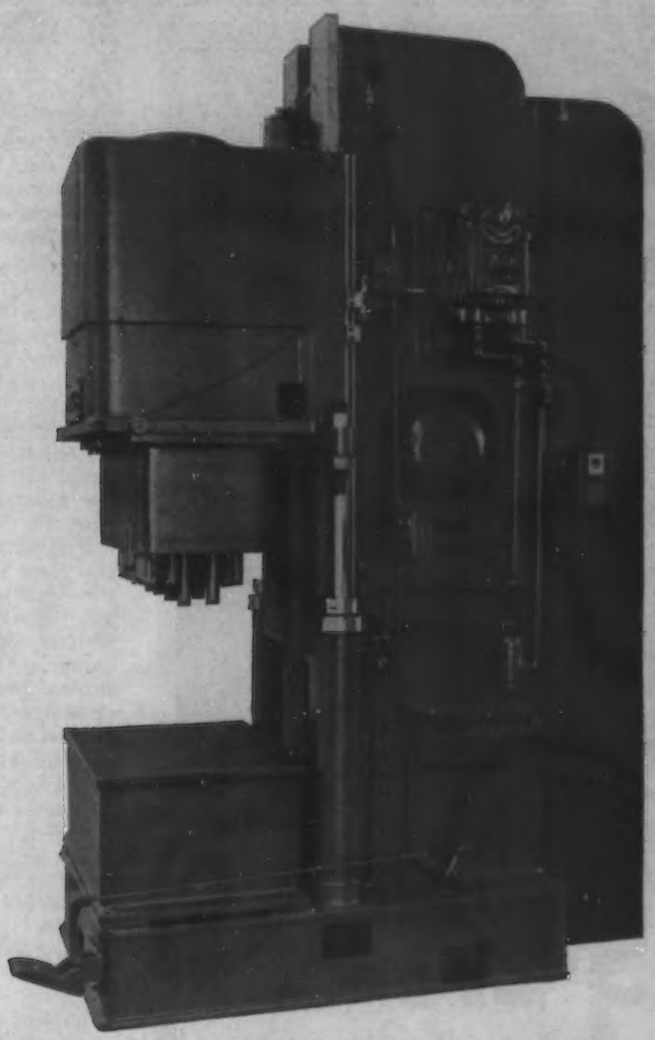
Bureau of Supplies and Accounts, Navy Department, will open bids on Sept. 10 for 1985 tons of plates, sheets and strips and 305 tons of angles and shapes for two submarines to be built at the Portsmouth, N. H., Navy Yard.

NEWS AND MARKET INDEX

Personals	66	New York Market	97
Obituary	80	Non-ferrous Market	99
Steel Ingot Production	86	Scrap Market and Prices	100-101
Summary of the Week	87	Finishing Iron & Steel	102-103
Pittsburgh Market	88	Warehouse Steel Prices	104-105
Comparison of Prices	89	Pig Iron & Raw Material Prices	106
Chicago Market	91	Fabricated Steel	108
Philadelphia Market	93	Machine Tool Activity	109
Cleveland Market	95	Plant Expansion & Equipment	110

BAKER

NO. 60-HO HYDRAULIC FEED



No. 60-HO machine arranged with 32 spindle fixed center multiple head for drilling lower face of cylinder block of 8 cylinder automobile.

Illustration shows another example of BAKER flexibility for specialized operations. A complete range of machines, both single purpose and quick change types, is available for drilling, boring, and tapping operations.

Send blueprints or sketches of your particular operations, and we will be glad to make definite recommendations.

BAKER BROTHERS, INC., TOLEDO, OHIO, U. S. A.

Newark, N. J. Office, 1060 Broad St.

Reduction in Number Of Bolts Proposed

A PROPOSED simplified practice recommendation covering stock nominal sizes of machine, carriage and lag bolts has been mailed to manufacturers, distributers and users by the Division of Simplified Practice, National Bureau of Standards, Department of Commerce, for consideration and acceptance.

This recommendation, which was proposed by the American Institute of Bolt, Nut and Rivet Manufacturers, lists marginal items leaning toward stock as well as stock items, based on the results of a study made by the institute's committee on standards and technical practices.

The sifting out of seldom-used sizes and concentration of production and use upon those items in greatest normal demand should result in savings all along the line, from the manufacturer to the user.

The simplified list of recommended sizes, if approved by the industry, will be promulgated by the U. S. Department of Commerce.

TOOL STEEL
Avoid Costly Production Delays
No need to hold up a job waiting for the right steel when you order from us.
Milne service provides a distributor within a few hours distance of every important mining and manufacturing center.
Send for our catalog.
NEW YORK
745 Washington St.
Tel. CHelsea 3-5315
BOSTON
915 Oliver Bldg.
Tel. HANcock 4999
Branch Offices And Warehouses
CHICAGO
17 N. May Street
Tel. MONroe 2996
DETROIT
915 Harper Ave.
Tel. MAdison 1170-1171
PITTSBURGH
604 Frick Bldg.
Tel. ATlantic 2171
NEW ORLEANS
611 South Peters Street
Tel. RAymond 0011
A. MILNE & CO.
1887 — FIFTY YEARS OF FRIENDLY SERVICE — 1937

Manufacturers Have A Word For It ~~

BISCO

When manufacturers need alloy or tool steel tubing they call for Bisco. They know we devote all of our time and energies to this one type of product, and the product reflects the skill in its making.

Quick delivery on Tool Steel Tubing, Ball Bearing Tubing, Stainless Tubing, Aircraft Tubing, Cold Drawn Mechanical Tubing, A.S.M.E. Boiler Tubing.

Call Bisco for tool steel tubing.

THE BISSETT STEEL COMPANY
The Tubing Specialists
Cleveland, O.

Allis-Chalmers Starts Big Program

AS the first steps in carrying out an appropriation of $3,500,000 to $4,000,000, for general plant expansion, Allis-Chalmers Mfg. Co., Milwaukee, has authorized construction and equipment work estimated to cost $2,650,000 to be undertaken immediately.

Bids were closed on Aug. 23 for three new buildings at the main works in West Allis, Milwaukee, as follows: No. 3 farm tractor shop, 160 x 602 ft., one story without basement; gear department building, 212 x 225 ft., one story without basement, and heat treating building, 100 x 130 ft., also one story without basement. Bids on the heat treating shop will close Aug. 30. On the same date bids will close for the construction at the farm implement works in La Crosse, Wis., of an assembly shop-boiler plant, 80 x 360 ft., one story without basement, and a storage building, 150 x 300 ft., three stories, without basement. All structures have been designed under the direction of Carl E. Meyer, company architect and engineer.

The enlargement program also projects a $750,000 addition to the industrial and track-type tractor works at Springfield, Ill., and purchase of new machinery and production equipment estimated to cost $150,000 or more at the branch factory at La Porte, Ind., where production of harvesting machinery is concentrated. Work already is under way on the rehabilitation of the boiler plant at the main works at West Allis, estimated to cost $800,000. The entire program is planned for completion by Jan. 1.

Amsler-Morton Co., Pittsburgh, has been recently awarded contracts for seven Amco pit furnaces, all of which will be center-fired recuperator type. They will have the seal lift type cover, and will be completely equipped with automatic temperature, pressure and combustion control. Six of the pits were ordered by the Tennessee Coal, Iron and Railroad Co., Birmingham, and one by the Timken Roller Bearing Co., Canton, Ohio.

New Slab Mill to Use 5000-Hp. Individual-Roll-Motors

CONSPICUOUS among new steel mills for supplying blooms and slabs to meet the expansion and increased production of wide strip mills, rod mills and merchant mills, is a large Pittsburgh steel mill to be powered by individual roll motors developed by Westinghouse. This mill will be able to roll slabs up to 60 in. wide from ingots weighing up to 45,000 lb. at an average rate of 250 tons per hr.

To provide the rolls with the 3,600,000 lb.-ft. torque necessary, the mill engineers have decided to drive each roll separately, using the principle of the twin-motor drive applied so successfully about six years ago to a 54-in. blooming mill and a 44-in. universal slabbing mill in the Middle West. Each roll will be driven by its own 5000-hp. reversing motor, and the vertical edging roll in conjunction with the slabbing mill will be driven by a 3000-hp. motor. The total of 13,000-hp. will be supplied by a flywheel motor-generator set consisting of three 3500-kw., 700-volt generators operating in parallel, driven by a 7500-hp. induction motor and a steel-plate flywheel, weighing 100 tons, and 15 ft. in diameter.

The arrangement of the drives is similar to the previous twin-motor 5000-hp. 40/80 r.p.m. machines except that the new drive will use single-armature motors, according to R. H. Wright, Westinghouse steel engineer. The former drives consisted of two 2500-hp. motors mounted on the same shaft, principally to obtain the least possible diameter so as to keep the angles of the spindles to the two rolls as small as possible. The mill builders have since found it possible to increase the spindle angle somewhat, hence the use of the simpler, but slightly larger diameter armature construction.

In the new mill a 5000-hp. motor will drive the lower roll through a spindle with universal joints, the spindle running at the fixed angle of about 2 deg. with respect to the roll. The top roll will be driven by a 5000-hp. motor through a shaft about 25 ft. long, running over the bottom-roll motor, and through a spindle with universal joints like the lower one. Because the upper roll changes in position and diameter the angle of the upper spindle will vary from 5 deg. above the horizontal to 5 deg. below. The distance between motor shaft centers will be 94 in. as against 83½ in. of the older installation.

The primary advantage of the twin-motor drive is said to lie in the elimination of the pinion and pinion stand. Such a stand for the transmissal of nearly 4,000,000 lb.-ft. torque would be very large and very heavy. The power losses, repair, and maintenance for such a stand are likewise important considerations, to be avoided if possible. Although the twin-motor method presents the easiest way of

PERFORATED METALS

Industrial - Ornamental
ANY METAL ANY PERFORATION

INDUSTRIAL—Whether your screening problems include very coarse or extremely fine materials, you will obtain the best results with perforated metal. H & K screens have increasingly served in all fields of industry for many years and established an unequaled standard in lasting performance. Regardless of size, metal or perforation, permit us to discuss your requirements with you.

ORNAMENTAL—Beauty of ornamental grilles depend largely on the experience of the designer and producer. Experience has built a complete assortment of H&K ornamental grilles that will satisfy your wants in both design and price.

Write us for further information.

The Harrington & King Perforating Co.

5657 FILLMORE ST., CHICAGO 114 LIBERTY ST., NEW YORK

ARMSTRONG

Equip Your Machine Tools with **ARMSTRONG** *Chrome-Vanadium Wrenches*

STANDARDIZE on lighter, thinner, stronger wrenches for machine wrenches, for automatic screw machines and other light, fast equipment with narrow set nuts and thin headed set screws. Their thinner heads assure a firm grip (without overhang). Their greater strength and longer handles permit a tighter set, give increased leverage. Their bright finish (chrome plate) makes them stand out—saves minutes lost in "fumbling" for the right tool.

STANDARDIZE on these lighter handier wrenches in the assembly department. They speed up work and reduce fatigue. There are types, sizes and matched sets for every need.

Write for Catalog and Prices

Armstrong Bros. Tool Co.
"The Tool Holder People"
309 N. Francisco Ave.
CHICAGO, U. S. A.
Eastern Warehouse and Sales:
199 Lafayette St., New York, N. Y.
San Francisco London

ATLAS CARS

Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.

20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

Atlas Products

Gas Electric and Diesel-Electric Locomotives

Electric Transfer Cars for Blast Furnaces and Steel Plants

Stockhouse Scale Cars for Blast Furnaces

Concentrate and Calcine Cars for Copper Refineries

Automatic and Remote Controlled Electric Cars

Pushers, Levellers and Door Extractors

Coal Charging Lorries, Coke Guides and Clay Carriers

Atlas Patented Coke Quenching Cars for By-Product Coke Ovens

Atlas Patented Indicating and Recording Scales

Special Cars and Electrically Operated Cars for every conceivable purpose

THE ATLAS CAR & MFG. CO.

Engineers – Manufacturers

1140 Ivanhoe Rd., Cleveland, O.

applying 10,000 hp. to a pair of rolls, other operating advantages accrue from it: roll chatter and spindle vibration are practically eliminated, the necessity for accurate matching of mill-roll diameter is eliminated, and higher rolling speeds can be maintained and mill tonnage can be increased.

Experience with the previous drives has confirmed the opinion that by properly interrelating the fields of the twin motors they will share the load properly and not tend to drive one roll faster than the other with resulting curling of the slab. Each motor has a cumulative series field and a differential series field which are cross-connected and indirectly excited by series-excited generators. Any tendency of one motor to take more than its share of the load strengthens its own field and weakens the field of the other motor, thus re-establishing load balance. In fact, by a simple change in the control circuit, it is possible to operate the motors at different speeds, should it be desirable to use rolls of different diameters.

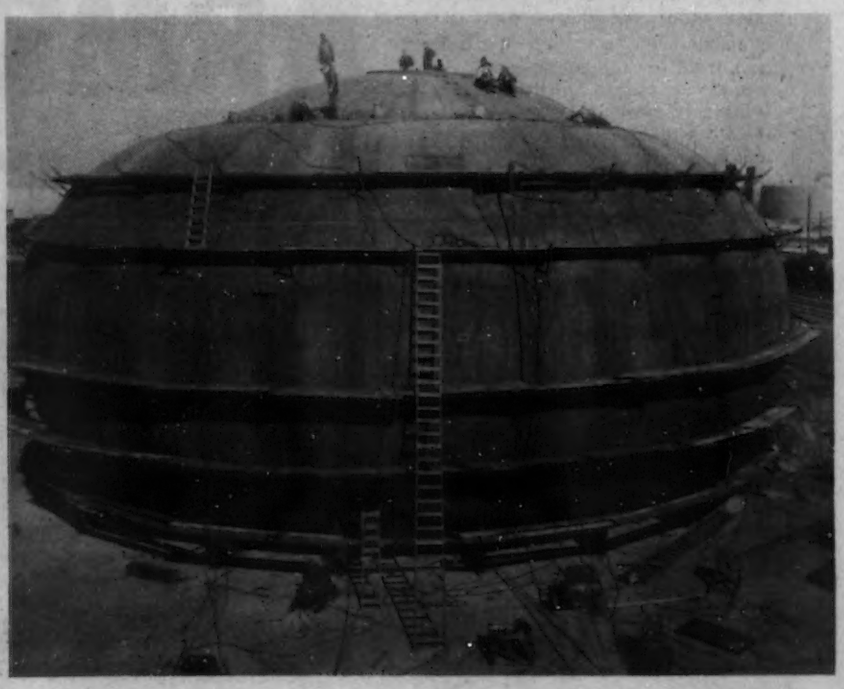
Two control pulpits will be provided so that the mill can be operated as a slabbing mill or as a blooming mill. When operated as a blooming mill the 3000-hp. edging roll motor will be disconnected. All equipment will be ventilated by an enclosed recirculating system using air coolers and circulating fans.

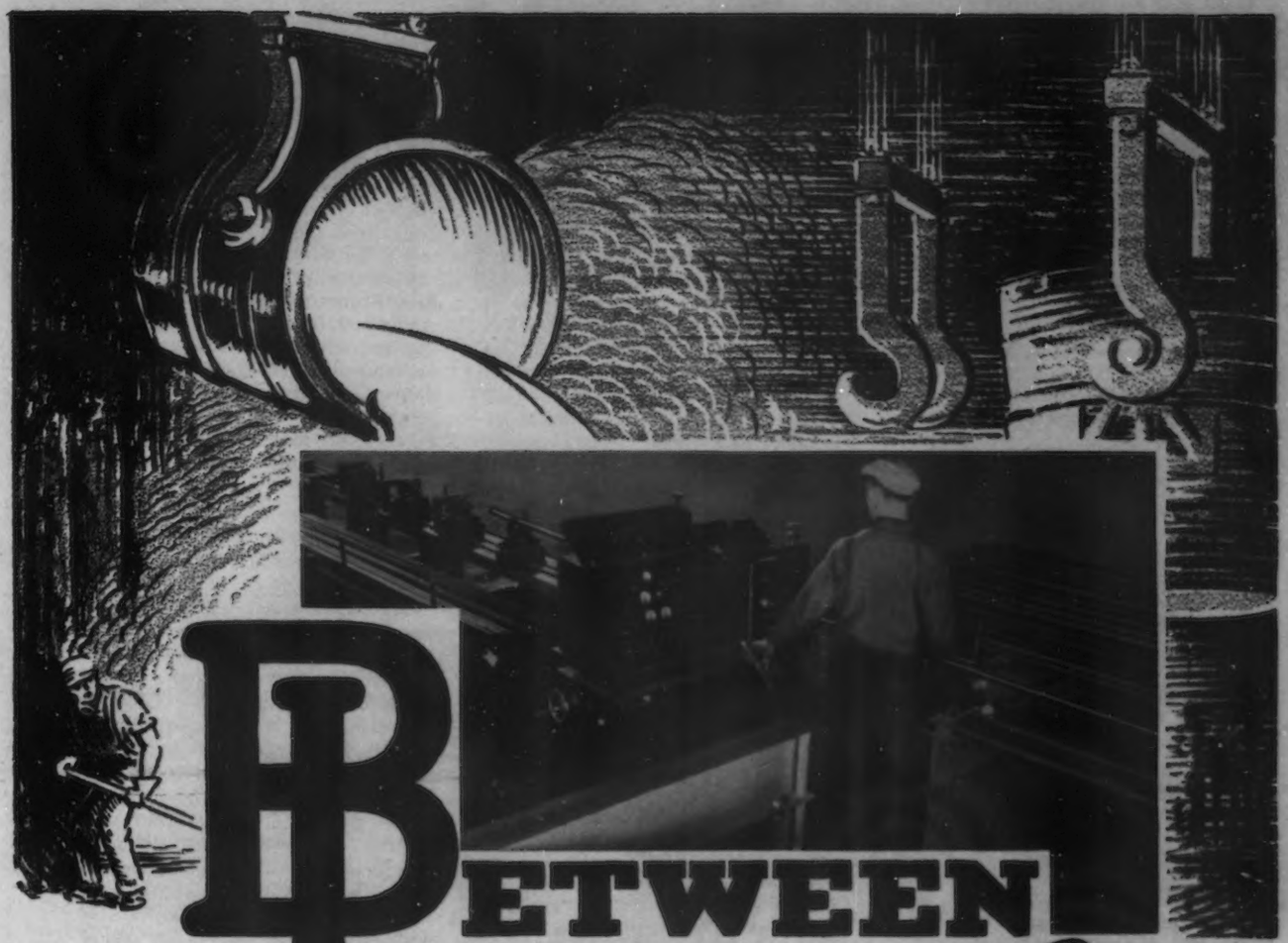
Huge Gas Tanks Weld-Fabricated

As part of an extensive modernization program, the Sinclair Refining Co., East Chicago, Ind., has completed the construction of the first of several new type gasoline storage tanks. Built in the shape of a huge steel "tomato," this tank is completely fabricated by arc welding. An idea of the amount of welding involved can be gained from the fact that the tank is 92 ft. in diameter and 47½ ft. high, with a capacity of 40,000 bbl. of casing-head gasoline. For almost all of the welding, General Electric single-operator arc-welding sets were employed.

An important consideration in determining the shape of the new tank, as well as the method of fabrication, was the fact that the structure, when completed, would be subjected to a working pressure of 15 lb. per sq. in. Unless high pressure is maintained within the storage tank, the gasoline will boil out. This type of tank is said to have been chosen because it permits the use of much greater internal pressures than the conventional-type tank will withstand. Upon completion, the new tank was tested with a pressure of 17 lb. per sq. in., with only one discoverable leak, which was easily repaired.

Pittsburgh Forgings Co., Pittsburgh, has acquired all outstanding preferred stock of the Greenville Steel Car Co., Greenville, Pa. This action completes a 100 per cent ownership of the Greenville Steel Car by Pittsburgh Forgings. The acquisition of the preferred was financed in part by working capital and in part by a bank loan.





BETWEEN THE LADLE AND *You*

. . . is the modern laboratory inspection service that B & L brings into practical production methods.

Making prime quality Cold Finished Steel calls for constant supervision at every stage of manufacture with a final check-up by rigid tests to insure that each individual bar is right.

The latest method of bar inspection is *magnetic analysis* . . . another step in the control of steel quality, made available in B & L mills by modern equipment.

Through the use of this "flaw detector," we are more positive in our inspection than if relying upon the human eye alone. It is a service that B & L has to offer in regard to steels for exacting uses where extremely close inspection is required to avoid blemishes that might result in heavy rejection.

You can specify B & L steels with the sure knowledge that science and experience have joined hands to give you a better product.

BETTER MADE STEELS LABORATORY TESTED

COLD DRAWN BARS
GROUND SHAFTING
•
ULTRA-CUT STEEL
EXTRA WIDE FLATS
•
SPECIAL SECTIONS
ALLOY STEELS

BLISS & LAUGHLIN, INC.

HARVEY, ILL. *Sales Offices in all Principal Cities* BUFFALO, N.Y.

GRAMMES SERVICES:—

ETCHING
Chemically engraving characters and design in metal with chemical and enamel coloring.

LITHOGRAPHY
An offset process permitting artistic effects on metal thru the use of vivid colors and pallid tints.

EMBOSSING
Design, wording, or characters are raised in relief or impressed in metal.

HARD ENAMEL
Prime color enamels are inlaid on metal and then baked at 1400° F.

MET-A-LABELS
The embossing and printing in colors on very thin metal joined to a paper back with or without glue back.

STAMPINGS
An unending variety of things stamped and formed out of ferrous and non-ferrous metals.

WIRE FORMING
Products formed of flat, round or half round wire.

FINISHING
Electro-plating, chemical coloring, japanning, spray lacquering, enameling.

MACHINERY
Building of machinery for cigar box, brush, wood product and other manufacturers.

ASSEMBLING
The complete assembling of metal units under careful supervision for accuracy and workability.

TOOLS & DIES
Our experience is wide, having made over 10,000 tools and dies.

ESTABLISHED 1875

L. F. GRAMMES & SONS,
INCORPORATED
ALLENTOWN, PENNSYLVANIA

Tin Research Council Issues New Booklets

THE International Tin Research and Development Council, 149 Broadway, New York, has published two new technical papers in the form of bound booklets. One of the papers, designated as A-56, covers the electrodeposition of tin additions to acid baths. A. W. Hothersall and W. N. Bradshaw, the authors, show that additions of sulphonic acids are ineffective when the acids are pure, but in crude qualities, however, they contain certain by-products of sulphonation which enable smooth deposits to be obtained. The second paper, marked A-55, describes a method whereby the volatilization of cadmium from alloys rich in tin can be made so complete that it has been adopted as method of analysis. Both publications are available upon request to the council.

Harnischfeger Plans 130 Steel Houses

HARNISCHFEGER CORP., Milwaukee, which has been developing pre-fabricated low cost steel dwellings for the past five years, has announced plans for the development of a "steel village" of 130 of such houses in a new real estate subdivision in West Allis, industrial suburb of Milwaukee, through its affiliate, Marwalt Realty Co., in association with local real estate firms. It is said to be the first low cost housing development yet undertaken by private capital. The subdivision in reality will serve as a "show room" for the Harnischfeger steel house division.

Necessary acreage has been acquired on Eightieth Street and the Honey Creek Parkway, and work already is under way on grading of streets and the installation of water and sewer facilities. The homes, to be sold at from $3,500 to $4,500, will each occupy a lot of 50-ft. width and a depth of from 100 to 140 ft., depending upon conformance with the community plan of the parkway project of the Milwaukee County Park Commission. The lots will be available at from $800 to $1,000. Work on the first group will be started shortly.

Welding Society's Annual Meeting

A COMPREHENSIVE program, to include eight separate technical sessions, with some 30 papers, has been planned for the eighteenth annual meeting and welding exposition of the American Welding Society, to be held at the Hotel Traymore and at the Convention Hall, Atlantic City, N. J., Oct. 18-22.

Of the technical sessions, two will be devoted to fundamental research in welding, one, with three papers, being under the chairmanship of Everett Chapman, president, Lukenweld, Inc., and the other, with five papers, under the chairmanship of T. M. Jackson. Sun Shipbuilding & Drydock Co. An industrial research session during the afternoon of Oct. 18 will be headed by Col. G. F. Jenks, Ordnance Department, U. S. Army. A joint session with the American Society of Mechanical Engineers has been planned for the afternoon of Oct. 19.

Beginning with Oct. 20, technical sessions and chairmen will be: Fabrication, H. C. Boardman, Chicago Bridge & Iron Works; Symposium on Alloy Steels, W. M. Mitchell, Carnegie-Illinois Steel Co.; shipbuilding, C. I. MacGuffie, General Electric Co.; and railroad, P. G. Lang, Jr., Baltimore & Ohio Railroad Co.

The annual business session, on the morning of Oct. 18, will include presentation of the Samuel Wylie Miller Memorial Medal for meritorious achievement contributing conspicuously to the advancement of the art of welding and cutting and of the Lincoln Medal for the best paper of the year in the American Welding Society Journal. Officers for the ensuing year will also be elected.

Steel Institute Publishing Manual on Iron and Steel

PUBLICATION of a pamphlet giving definitions of pig iron and ferro-alloys has been announced by American Iron and Steel Institute. That pamphlet comprises section 1 of a projected Steel Products Manual.

The institute plans to issue from time to time similar sections covering other major classes of products as well as general sections, dealing with manufacturing tolerances, methods of inspection, methods of sampling and chemical analysis, definitions of technical terms and other related information.

Copies of the pamphlet can be secured from American Iron and Steel Institute, 350 Fifth Avenue, New York, at the following prices, postage paid:

For single copies or lots up to 10..15c each
For lots of 11 to 50.....12½c "
For lots of 51 to 100.....10c "
For lots of over 100..... 7½c "

...OBITUARY...

WILLIAM E. KRAPP, retired executive of the Hupp Motor Car Co., is dead at the age of 57. Mr. Krapp, who was divisional superintendent of the Hupp organization, retired in 1931. For five years he was a councilman at Grosse Pointe Park, Mich.

❖ ❖ ❖

JORDAN KORP, since 1905 identified with the Leeds & Northrup Co., Philadelphia, died of a heart attack at his home in Philadelphia on Aug. 10, aged 64 years. He received his early training as a toolmaker in his native country of Norway and was sent by the Government to the United States to secure the most modern ideas for the further development of the tool and machine industry in Norway. After making his report, he returned to this country the following year. After being with the Leeds & Northrup Co. for a short time, he was made foreman of the toolroom. Actively interested in the development of improved methods of hardening, he contributed much to the Hump method and took charge of service work in the field when this method became more and more widely known.

❖ ❖ ❖

CHARLES P. WOODWORTH, since 1909 vice-president of the Weber Chimney Co., Chicago, died suddenly on Aug. 12, aged 56 years.

❖ ❖ ❖

GEORGE W. FOWLER, manager of the Chicago office of the New Departure Mfg. Co., Bristol, Conn., died after a long illness on Aug. 9, aged 61 years. He had been with the company for almost 20 years. Among his previous business connections were the Garwood Electric Co., Crocker-Wheeler Co., and the Schafer Ball Bearing Co.

Maas & Waldstein Co., Newark, N. J., has announced the development of a new black enamel that dries to a rubber finish. The enamel is designed for use in finishing electrical apparatus, instrument panels, radio bases, etc., and is claimed to be tough, durable and possess high electrical resistance. It is applied by spraying.

for every cleaning job—

a WHEELABRATOR

Four WHEELABRATOR applications are illustrated: a Tablast for production cleaning of parts not suitable to tumbling; a Tumblast for rapid cleaning of miscellaneous castings, forgings and pieces from half an ounce to 300 pounds; a Utility Cabinet for handling single pieces and castings secured to runners; and a Special Cabinet for cleaning medium to large size parts, sheets, bars, tubes, etc.

No matter what your cleaning job may be, there is a WHEELABRATOR designed for the job — a WHEELABRATOR that will cut cleaning costs up to 50%, — increase production — improve the finish and generally reduce cleaning room overhead.

Bring your special cleaning problems to American engineers. Their experience is unequaled and their recommendations are available to you without obligation on your part.

THE AMERICAN FOUNDRY EQUIPMENT COMPANY
510 So. Byrkit St., Mishawaka, Indiana

Makers of Abrasive Blast Equipment for every metal cleaning operation—dustube Dust Collectors, Sand Cutters, and other foundry and industrial equipments.

Automatic
GAS SAVING EQUIPMENT

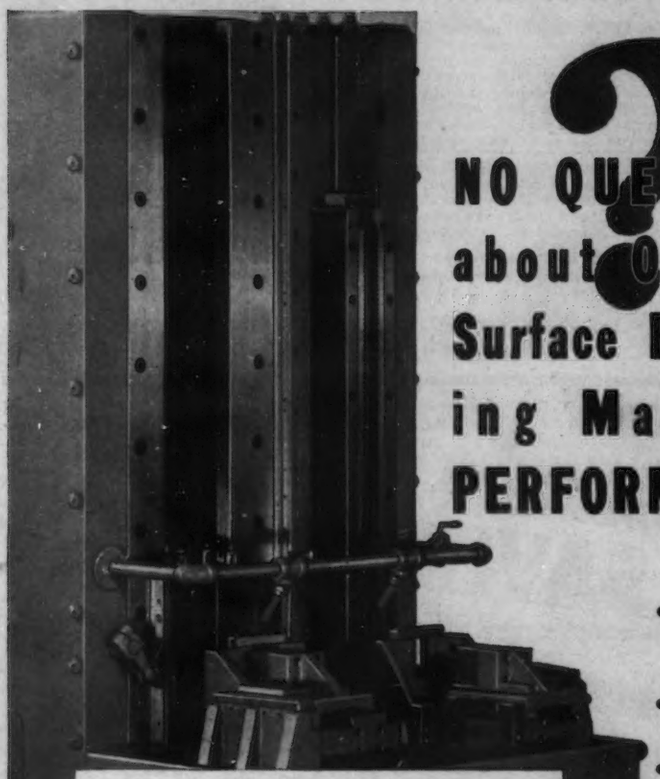
WELDIT MODEL "W"
Automatic WELDING TORCH
Thumb lever in handle controls welding flame. Release of thumb reduces flame to pilot size. No re-lighting or re-adjusting of flame necessary between welds. Saves 25% to 30% gas alone. Weight 13 oz. Length 14½ inches. Tip sizes 3 thru 8.

WELDIT MODEL "A-20"
Automatic WELDING TORCH
Has automatic shut-off (gas saving) feature for intermittent welding work or instantly adaptable to continuous welding job by simply sliding thumb lever into retaining or locking slot. Weight 1 lb. 10 oz. Length 18 inches. Tip sizes 2 thru 12.

WELDIT MODEL "E"
GASAVER
Hanging torch on Gasaver hook, between welds, automatically shuts off intake lines, saves gas. Lifting torch off hook and passing across pilot light instantly produces full welding flame, no re-adjusting necessary.

WELDIT ACETYLENE CO.
641 BAGLEY AVE. DETROIT, MICH.

Free TEST FOR TWO WEEKS IN YOUR PLANT



NO QUESTION about Oilgear Surface Broaching Machine PERFORMANCE

- One or more pieces finish-broached simultaneously
- Highest production at close tolerances
- Each unit complete and self-contained
- Single lever, semi-automatic control
- Automatic full interlock of broach and shuttle tables
- Welded all-steel construction
- 6, 10, 16, 20 ton capacities

The Oilgear Variable Delivery Pump has enough long and exacting service behind it to demonstrate beyond question its greater smoothness of operation, its greater dependability of performance, what it means in reduced maintenance costs. And just as you would expect, this famed pump, applied to Oilgear Surface Broaching Machines, is setting new high marks in production at the closest tolerances desired. For what Oilgear means in terms of *your* problems, write for full information including Bulletin 23,000A. THE OILGEAR COMPANY, 1303 W. Bruce St., Milwaukee, Wis.

OILGEAR SURFACE BROACHING MACHINES

Youngstown's Models Roll and Stamp Steel

A SCALE model of a 72-in. 4-high 3-stand cold reduction mill which actually rolls steel, and a scale model of a stamping press which stamps ash trays for presentation to visitors, are proving popular industrial exhibits of the Youngstown Sheet & Tube Co. As shown in the accompanying photo, both of these units are actual reproductions of originals installed in the plants of the company, constructed on a scale of 1½ in. to 1 ft. Also shown in the photo are C. A. Davis, assistant general manager of the Campbell division (right), and J. S. Stanier, superintendent of the cold strip mill, Campbell division.

The cold mill model rolls miniature coils of strip steel, reducing the thickness and adding to the length of the strip in exact imitation of the operation of the company's cold reduction mill. The steel is given one pass through the three stands of the model and then recoiled. The coils then are placed on the model press, where the steel is stamped into ash trays of attractive designs.

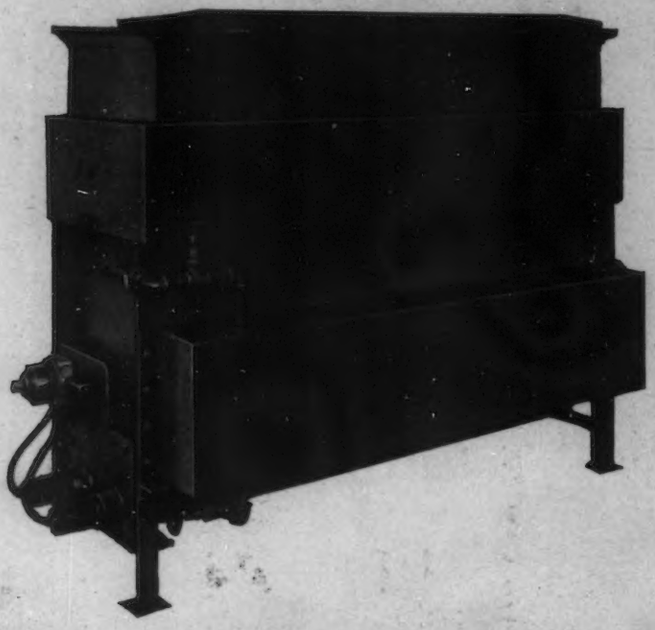
The models were constructed in their entirety by employees of the pattern shop and tool room No. 1 of the machine shop from plans prepared by and under the supervision of Myron S. Curtis, sales promotion director.

Ludlum Steel Co. has offered a trophy and an award of $2,000 to the airplane pilot winning the Thompson Trophy Race, to be held in Cleveland, Sept. 9, provided a new speed record is established. If no new record is made this year, the award will be held over until such a record is made.

Ohio Ferro-Alloys Corporation
Canton, Ohio

Design of Lincoln Medal Approved

THE design of the Lincoln Gold Medal, which was accepted by the American Welding Society early this year, for presentation to the author of the best paper on any phase of welding published in the *Journal of The American Welding Society* during the year November, 1936 to October, 1937, has been approved. The sculptor has started work on the model. The medal, offered by J. F. Lincoln, president of Lincoln Electric Co., Cleveland, as a stimulus to the preparation of worth-while contributions to the art of welding, is to be of solid gold. One side will bear the wording, "Lincoln Gold Medal Award—American Welding Society." This inscription will surround a central figure symbolic of electric welding. The figure will be of an arc welding operator with the arc in operation. The wording on the reverse side of the medal will be in relief. Also, lettered in relief on the reverse side will be the name of the individual winning the award, together with the date of presentation.



WHY A MANUFACTURER OF METAL OFFICE EQUIPMENT USES DETREX DEGREASING

A large manufacturer of metal office equipment gives the following reasons for operating a DETREX VH 400 Degreasing Machine on his production.

1—Less space and time are required for cleaning
2—No oil or chemical residue left on the metal to bleed out after finishing
3—No oil seepage from seams
4—Cleaning costs reduced over previous method
5—Better finish possible
6—Elimination of rejects due to improper cleaning
7—No fire hazard—Perm-A-Clor Solvent is non-inflammable.

Ask for information on your cleaning problems.

DETROIT REX PRODUCTS COMPANY

Metal Cleaning Engineers—Solvent Degreasing and Alkali Cleaning

13013 HILLVIEW AVENUE DETROIT, MICHIGAN

New York Office: 130 West 42nd St. Chicago Office: 201 North Wells St.

Cleveland Office: 812 Huron Rd.

CIO Wins Election in Machine Tool Plant

THE first test of CIO activity in the Cincinnati machine tool district developed last Friday, when employees of R. K. LeBlond Machine Tool Co. ballotted under the direction of the National Labor Relations Board. The contest was between the CIO and the Independent Employees Organizing Committee. CIO was victorious with a count of 261 against 159 for the independent group.

Wheeling Steel Corp. reports that more than 80 per cent of the 6 per cent preferred stock of the company has already been deposited under the corporation's plan of recapitalization. Under this plan, which was approved in July, one share of new $5 cumulative convertible prior preferred stock and one half share of common stock is issuable in the exchange for each share of old 6 per cent preferred stock. The time for deposit of the old stock has been extended to on or before Sept. 29, 1937.

Hagan Corp., Pittsburgh, has received contracts for complete combustion control systems for three slab heating furnaces and six soaking pits from Tennessee Coal, Iron and Railroad Co., Birmingham. Hagan will also furnish pressure control equipment for soaking pits now being installed at Granite City Steel Co., Granite City, Ill., and the Steel Co. of Canada, Hamilton, Ont.

. . TRADE NOTES . .

Mathews Conveyer Co., Ellwood City, Pa., manufacturer of mechanical handling equipment, has opened its own office in Detroit, where for the past 20 years it has been represented by a sales agency. Two conveyor engineers who are familiar with the Michigan territory and its requirements will be in charge of the office, which is located in the Curtis Building, 2842 West Grand Boulevard. In addition, sub-agents are being appointed throughout the State to supplement the facilities of the Mathews headquarters in Detroit.

American Screw Products Co., Newark, N. J., manufacturer of screw machinery products, has moved to larger quarters at 38-42 Littleton Avenue. John A. Cozzone is president.

Bartley Crucible & Refractories Co., Trenton, N. J., has been reorganized as Bartley Crucible & Refractories, Inc. L. H. Lawton continues as president, and there have been no other personnel changes. The plant is again in production after numerous improvements in equipment.

General Refractories Co., Philadelphia, has appointed the Hull Industrial Supply Co., Toledo, Ohio, as distributer in the Toledo area.

Bunting Brass & Bronze Co., Toledo, has removed its Kansas City branch sales office and stockrooms to 1922 Grand Avenue. Gordon Schutzendorf has been appointed sales representative of the company in the Eastern territory. He will make his headquarters in the New York City branch offices.

Safety Socket Screw Corp. has moved its office and plant to 4440-46 North Knox Avenue, Chicago.

High Speed Hammer Co., Inc., Rochester, N. Y., maker of high speed riveting hammers, high speed precision drills and the Bruno slotting attachment for shapers, has announced the appointment of Raymond H. Dauterich, 1205 East 25th Street, Baltimore, as direct factory representative in Maryland, Delaware, District of Columbia and middle Pennsylvania up to and including Harrisburg.

Rogers Brown-Lavine Co. has moved its Cambridge, Mass., office to the Kendall Square office building, 238 Main Street.

United Engineering & Foundry Co., Pittsburgh, reports net income for six months ended June 30, 1937, of $2,166,173, equal after deductions for preferred stock to $2.61 a share on the common. This compares with a net income of $1,293,232 equal, after deductions for preferred stock, to $1.55 a share on the common for the first six months of 1936.

Coming Conventions

Sept. 20 to 22—American Gear Manufacturers Association, Spink-Wawasee Hotel, Lake Wawasee, Ind. J. C. McQuiston, Penn Lincoln Hotel, Wilkinsburg, Pa., secretary.

Sept. 30 to Oct. 1—American Foundrymen's Association, fall technical conference, Columbus, Ohio.

Oct. 7 to 9—Society of Automotive Engineers, second annual Aircraft Production Meeting, Los Angeles. J. A. Warner, 29 West 39th Street, New York, secretary.

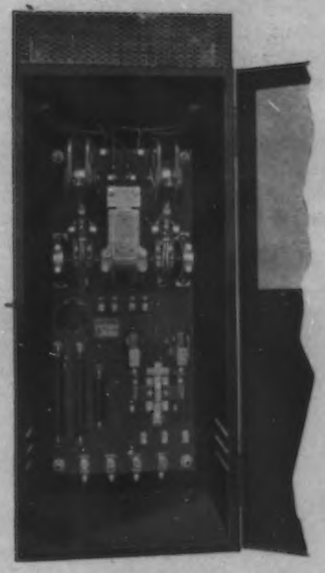
Oct. 11 to 12—Porcelain Enamel Institute, seventh annual meeting, Chicago, to be followed by the annual forum at Ohio State University, Columbus, Ohio.

Crucible Steel Co. of America showed a net profit of $3,099,796.86 in the six months' period ended June 30. This was equivalent to $5.03 a share on the 450,000 shares of common stock outstanding after payment of two quarterly dividends of $1.75 each on 238,800 shares of preferred stock and after all allowances for all taxes except on undistributed earnings. In the first half of 1936, earnings were $1,262,512.64, equal to 95c. a share on the common.

New! MAGNET CONTROLLER
AUTOMATIC-DISCHARGE TYPE

•

It's adjustable!



Now . . . with this New EC&M Magnet Controller, it is possible to speed up lifting magnet operation by adjusting the controller for a quick, clean drop of all loads. At the start of operation, the operator simply adjusts the controller on the first few lifts to get a fast release. It is not necessary to touch this adjustment again as long as the type of material handled remains about the same and the line voltage remains constant. If he switches to handling a different class of material or to a different size of magnet, or there is a change in line voltage, a small turn of the rheostat-dial sets the controller for a quick release under the new condition. ***This is a very simple adjustment and is as easy to make as turning the dial on a radio.***

This is an entirely new controller, having wound-on-edge discharge resistors mounted in ventilated enclosure on top of the cabinet, mill type contactors, and a narrow width for easy mounting on rear or side wall of crane cabs. Write for new 2-color folder giving full details.

THE ELECTRIC CONTROLLER & MFG. CO.
2700-A East 79th St. Cleveland, Ohio

To make a lift, the operator simply moves the small lever of this Master Switch to the "Lift" position and, when ready to discharge the load, moves it to the "Drop" position. In this position, the load is released automatically and the controller automatically disconnects the magnet from the line.

EC&M AUTOMATIC-DISCHARGE MAGNET CONTROLLERS
FOR ALL SIZES AND ALL TYPES OF LIFTING MAGNETS

Simple Classification of Mechanical Power Equipment

(CONTINUED FROM PAGE 37)

where two or more chain drives are used together for this purpose.

Resilient Drive Methods

Belt drives, sometimes called "frictional" drives, depend upon the friction developed between a belt and two or more pulleys to transmit power. This friction-grip causes the driving pulley to pull the belt. Similarly, friction grip causes the moving belt to turn the driven pulley. Sometimes the smooth face of the pulley may be inset with vacuum cups, cork or fibre to increase this friction grip, or the belt may be constructed with friction-building strips or spots of material on the side next to the pulley, to serve the same purpose. The bulk of flat belts in use, however, are smooth-surfaced, and the pulley faces likewise. In V-belt practice, narrow, truncated-pyramid section belts, usually in multiple, run in V-shaped grooves on the pulley face, depending on the friction developed between the sides of the belts and the sides of the V grooves to transmit the power, rather than on the friction between the underside of the belt and the face of the pulley.

Since the material of which the belt is made is always more or less elastic in nature, and since the frictional contact between belt and pulley permits slip, belt drives are resilient, and therefore are adapted to handle shock loads. This does not mean that they are only adapted to shock loads. A smooth-running belt, at proper tension, will drive a steady load positively; the actual amount of power transferred from driving to driven shaft will be slightly less than with positive drive methods, but the danger of damage from shock loads will be materially lessened.

Variable speed transmissions range all the way from step-cone pulleys, giving a few steps of variation, to expanding diameter pulley drives of the Reeves and Allis-Chalmers types, giving infinitely variable speeds within certain clear limits; the friction disc and roller transmissions of the Transitorq and Graham types; and the hydraulic transmission employing a variable delivery oil pump and a constant displacement oil motor.

Hydraulic drives, while positive in action, are classed as resilient drives because, although the fluid medium is practically incompressible, the operation of the pump and motor is such as to afford even speed without pulsations, practically unaffected by variations in the load, and an effect of "cushioning" when sharp shock loads are encountered.

Pneumatic drives are highly resilient, due both to the compressibility of the air and the cushioning effect of the motor.

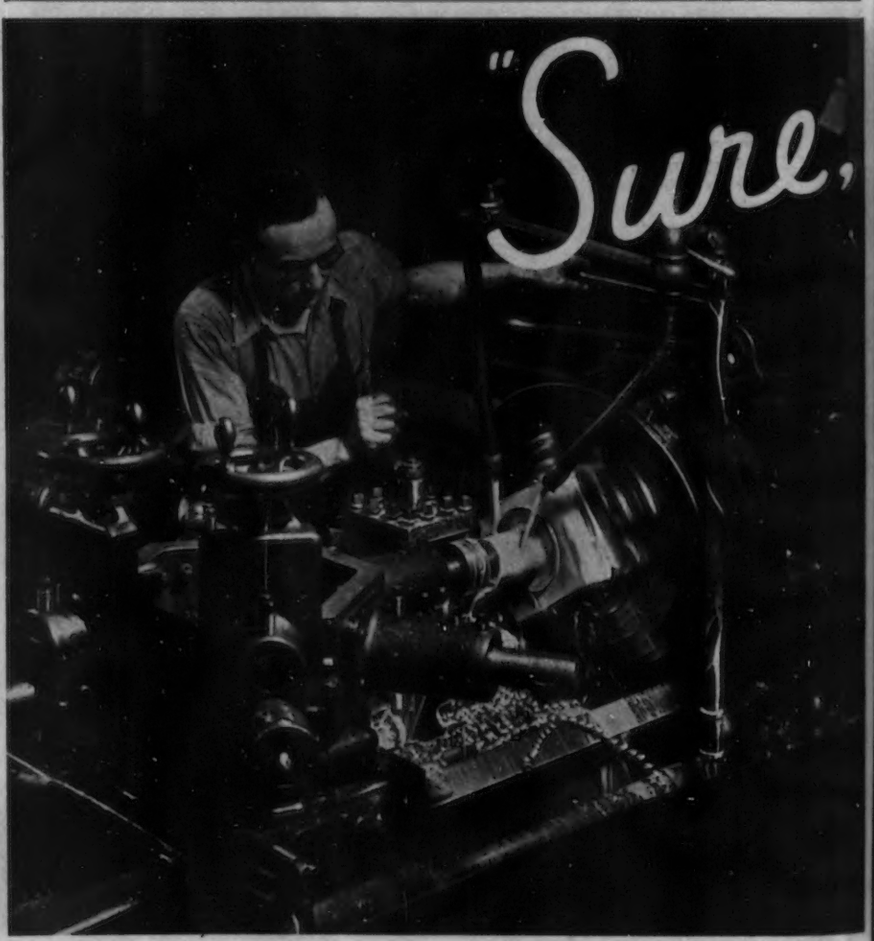
Flexible shaft drives are highly positive in action, yet they must be classed as resilient drives because of the shock-absorbing characteristics of the shafting.

With each of the *methods* of mechanical drive listed on the chart, the equipment used varies according to circumstances. The usual equipment to be considered in connection with each drive method is noted on the chart below each long horizontal line denoting the flow of power from the motor to the machine. This equipment will be briefly described (without too much engineering detail) in the future articles of this series; likewise the usual applications of the equipment given for various types of machine loads, with due attention to the economic factors involved.

It is suggested that, before taking up the detail of the discussion of the various mechanical power transmission *methods*, a brief review be made of the four chapters dealing specifically with the economics of industrial power transmission *systems* (that is, individual motor drive and modern group drive) published as follows:

Nov. 19, 1936—The Economics of Industrial Power Transmission.

Dec. 17, 1936—Power Transmission in Relation to Production.



Dec. 31, 1936—How Many Machines to Each Motor?

Feb. 11, 1937—The Golden Mean.

These four chapters embody the theory of the economic application of power to machines; the ensuing chapters will discuss in detail the economic application of equipment to meet the requirements of both systems of drive.

"Double Treating" Track and Frog Bolts

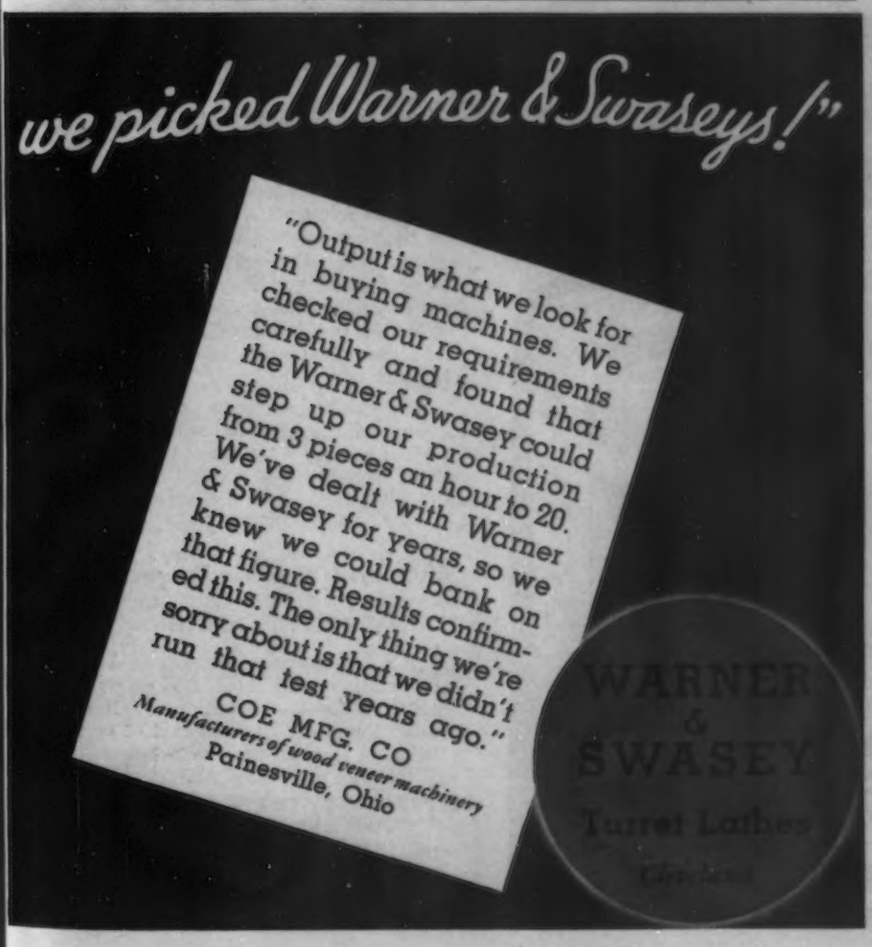
(CONTINUED FROM PAGE 32)

tained in the bolts leaving the quenching medium. To this must also be added another variable due to irregularities in processing through the quenching medium, as for instance, dropping on the conveyer, falling off, etc. Still another differential exists between the threaded end of the bolt and the shank. The quench is more effective in the threaded end due to the greater amount of exposed surface and this naturally results in a lack of uniformity.

Physical Properties Improved by Reheating After Quench

In order to overcome these objectional features, we have altered our manufacturing procedure to provide a full quench and a draw by reheating to a predetermined temperature. We have found that a proper drawing temperature following a full quench compensates for the hardness variation due to sectional differences in the bolt, and subsequent experience has indicated that it is possible to employ the most suitable quenching material, determined by the chemistry and section of the bolt. As a direct result of the new "double treatment" procedure, tests show that at a specified tensile strength the ductility of the "double treated" bolts is much higher than that of the time quenched bolts, and the reduction of area is approximately 50 per cent greater. Elongation is about double. Another favorable consequence is that "double treated" bolts are satisfactorily uniform in hardness throughout the entire length of the bolt, as measured by Brinell tests, while, as mentioned before, time quenched bolts vary greatly between the shank and thread sections.

The equipment required to "double treat" bolts permits us to approximate a fully hardened product for any period of time in the quenching bath, above 15 sec. Micrographs of treated bolts show a full quench and uniform structural conditions prior to the draw; a most desirable condition. Laboratory impact tests (see illustration) have indicated that the values of "double treated" bolts are consistently 50 per cent higher than time quenched material, and this substantiates the point previously made—that exact quenching control is necessary to secure bolts possessing maxium physical values and uniform internal structure.


we picked Warner & Swaseys!"
"Output is what we look for in buying machines. We checked our requirements carefully and found that the Warner & Swasey could step up our production from 3 pieces an hour to 20. We've dealt with Warner & Swasey for years, so we knew we could bank on that figure. Results confirmed this. The only thing we're sorry about is that we didn't run that test years ago."
COE MFG. CO
Manufacturers of wood veneer machinery
Painesville, Ohio
WARNER & SWASEY
Turret Lathes

Studies of Casting Stresses in Chilled Iron Rolls

(CONTINUED FROM PAGE 51)

effect on the magnitude of the stress within the roll.

6.—Deeper chill will increase the tangential stress on the outer zone and the radial stress in the center of the roll.

The author wishes to express his appreciation to the officials of the Farrel-Birmingham, Inc., for permission to publish the material contained in this paper and is greatly indebted to the International Nickel Co. for use of the facilities in its research laboratory.

Bibliography

[1] E. Piwowarsky, Hochwertiger Grauguss (Springer, Berlin, 1929), p. 176.

[2] E. Schüz, "Uber die Wissenschaftlichen Grundlagen der Herstellung von Hartguss Walzen." Stahl und Eisen 42 (1922), p. 1610-17, 1773-81 and 1900-6.

[3] J. S. Caswell, "Sheet and Tinplate Rolls. An investigation into Roll Loads, Stresses and Causes of Roll-Breakage." Proceedings of the South Wales Institute of Engineers. Vol. XLVI, 1931.

[4] H. Scott, "Origin of Quenching Cracks." U. S. Bureau of Standards. Scientific Paper No. 513.—L. W. Kempf, H. L. Hodkins, E. V. Ivanso, "Internal Stresses in Quenched Aluminum and some Aluminum Alloys," Metals Technology, 1934. E. Heyn, "Physical Metallography." Trans. by M. A. Grossman, New York. 1925. John Wiley & Son. G. Sachs, "Der Nachweis Innerer Spannungenin Stangen und Rohren." Ztsch. Metallkunde, 1927, p. 352.

[5] Report of Sub-Committee XV, Committee A-3 on Impact Testing. Proceedings, American Society for Testing Materials, Vol. 33, Part 1, 1933.

[6] A. E. Boye, "Strength of Materials," p. 16, McGraw-Hill Book Co., New York.

Large Flood Gates To Protect Plants

THE first major flood prevention project to reach the construction stage in the Pittsburgh district will protect the Turtle Creek Valley in which lies the large works of the Westinghouse Electric & Mfg. Co. and other major industries.

In the future when high water from the Monongahela River threatens the valley, two huge gates will be lowered, forming a barrier against rising waters and the normal flow of Turtle Creek will be continued by means of powerful pumps. The project, announced by Ralph Kelly, Westinghouse vice-president, will cost $500,000.

Pumping the normal flow of the creek into the area beyond the gates will not change appreciably the level of the river at any flood stage it might reach, although it will hasten by a few minutes the time required to attain a flood crest.

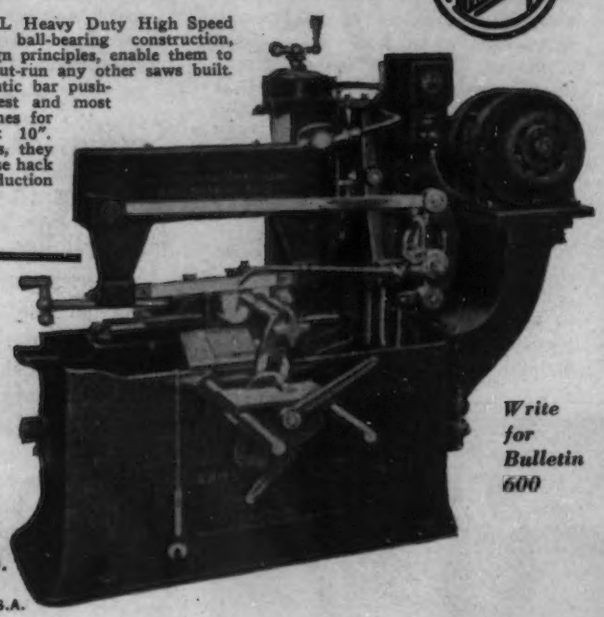
Installation of the gates will be made just below the main works of the Westinghouse Electric & Mfg. Co. One of the steel gates, 80 ft. long by 30 ft. high will form a dam in Turtle Creek; the other, 40 ft. long and 20 ft. high will close the street. When not in use the gates will be held approximately 20 ft. above the street level to accommodate traffic.

SPEED, WEIGHT and STAMINA

MARVEL

Mark these new MARVEL Heavy Duty High Speed Sawing machines. All ball-bearing construction, coupled with advance design principles, enable them to far out-cut, out-last, and out-run any other saws built.

With or without automatic bar push-up, they are today's fastest and most efficient cutting off machines for bar stock up to 10" x 10". Strictly multi-purpose tools, they will serve as general purpose hack saws and/or automatic production machines.



MARVEL No. 6
capacity 6" x 6".

MARVEL No. 9
capacity 10" x 10".

MARVEL No. 6A
with Automatic Bar Push-Up
capacity 6" x 6".

MARVEL No. 9A
with Automatic Bar Push-Up
capacity 10" x 10".

Write for Bulletin 600

Armstrong-Blum Mfg. Co.
"The Hack Saw People"
5849 Bloomingdale Ave., Chicago, U.S.A.

U. S. Steel to Merge Three Railroads

WASHINGTON, Aug. 24.—Application of the United States Steel Corp. proposing a merger of three of its railroad subsidiaries has been set for hearing Sept. 1 by the ICC.

If approved, the Duluth, Missabe and Iron Range Railway Co. will acquire control of the Duluth & Iron Range Railroad Co. and the Interstate Transfer Railway Co.

He Wants to Know About Bearing Metals

A MACHINE tool builder asks THE IRON AGE:

"Where can we get information on the friction of different bearing metals when the bearings are run to soft steel spindles, pack hardened spindles and chromium plated spindles, the bearings being high lead content bronze bearings and Babbitt bearings?"

Any help you can give this manufacturer will be appreciated by him and by THE IRON AGE (239 West 39th St., New York City).

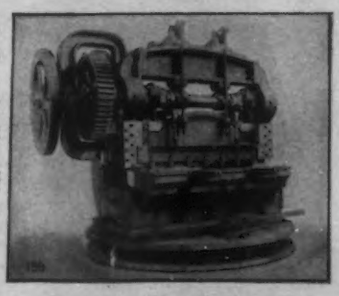
PRESSES • DIES • METAL-FORMING MACHINERY

FABRICATING MACHINERY

PUNCHES • SHEARS • SPACING TABLES

Plate Shears — for Steel Plants

• Leading steel plants all over the country use Thomas Plate Shears, appreciating that they DO stand up under toughest use day in and day out! The complete line of Thomas shears is sure to meet your every need. Write for information.



THOMAS
MACHINE MANUFACTURING COMPANY
Name changed from Thomas Spacing Machine Co.
PITTSBURGH, PA.

BENDING AND STRAIGHTENING MACHINES • MULTIPLE DRILLS

Acetylene Ass'n To Meet in South

THE International Acetylene Association will hold its thirty-eighth annual convention at the Hotel Tutwiler, Birmingham, Nov. 10-12. A comprehensive program, to include both day and evening sessions and covering all branches of oxy-acetylene welding and cutting, is being planned. H. F. Reinhard, 30 East 42nd Street, New York, is secretary of the association.

Miller-Tydings Resale Price Act May Cause Dropping of Price-Fixing Cases

Washington, Aug. 24—Federal Trade Commission officials have denied published reports that the Miller-Tydings Resale Price-Fixing Act, which was approved last week by President Roosevelt, might mean abandonment of the pending cement and cast iron soil pipe cases.

It was pointed out that the two cases, which charge violation of the anti-price discrimination section of the Clayton anti-trust laws, involve the basing point system as the principal means employed for carrying the alleged combinations into effect.

Published reports also had said that the Government's position in the Aluminum Co. of America case had been weakened considerably by the new law and that the anti-trust laws had been as effectively abrogated as they were under the NRA. The point had been raised that it would be useless to adjudge a corporation a trust and then be unable to prevent price fixing.

However, there was no definite information forthcoming from the Department of Justice that the law would mean the end of the Aluminum case or that its enactment would even retard the progress of the case. It was pointed out by officials that the new law permits vertical agreements; that is, price agreements between manufacturers and jobbers, but specifically bans agreements between manufacturers.

The Miller-Tydings Act, attached as a rider to an appropriation bill, was signed "reluctantly" by the President who, a few months earlier, had upheld the FTC in the contention the bill was undesirable and likely to increase consumer prices unduly.

The Miller-Tydings law amends the anti-trust laws to the extent of permitting price-fixing agreements between manufacturers and distributers in the 42 States which have legalized price maintenance compacts.

41,630 Freight Cars Installed to Aug. 1

DURING the first seven months of this year, Class 1 railroads installed 41,630 new freight cars, the largest number for any corresponding period since 1930, according to the Association of American Railroads. In a comparable period in 1936, 14,914 freight cars were put into service. 198 steam locomotives and 25 diesel and electric locomotives were also installed during the seven-month period, as compared with 26 steam and 14 diesel and electric locomotives in a like period in 1936.

Rolling stock on order Aug. 1 totaled 38,089 freight cars, 283 steam locomotives and 29 diesel and electric locomotives. On Aug. 1, a year ago 27,151 freight cars, 65 steam locomotives and 20 diesel and electric locomotives were on order.

Weirton Case Before Labor Board Marked by Frequent

PITTSBURGH, Aug. 24.—Marked by repeated clashes between the National Labor Relations Board examiner and Weirton Steel Co.'s chief counsel, the hearing on the NLRB's complaint against Weirton Steel Co. rounded out its first week with the records revealing more than 1000 pages of testimony.

The stormiest session occurred yesterday when Weirton counsel bitterly objected to testimony of NLRB witnesses based on hearsay, rumor and in one case what "a stranger coming to my door at night said."

Despite objections, such "ghost-like" testimony was allowed to remain in the record and the "trial" went on with Weirton being accused of everything from maintaining a spy system to attempting to pay a workman $10 a day and furnish him with an automobile just "to stay away from the CIO."

Each time Clyde A. Armstrong, Weirton counsel, objected to such testimony (which occurred in practically every case), his objections were overruled. So disgusted did he become at one time that he inferred that the company might withdraw from the "trial."

The majority of testimony during the past week revolved around an attempt by the NLRB attorneys to prove that the Weirton Steel Co. was connected with or knew about the existence of a so-called "hatchet gang" which the SWOC has alleged beat up and generally mistreated union organizers. At the same time the presence of another group dubbed the "night owls" was disclosed during testimony and it is expected that Weirton's counsel will contend that this organization was an SWOC group which committed as much terrorism as the alleged "hatchet gang." The steel company has already denied any connection with or knowledge of such a group known as the "hatchet gang."

Anti-union feeling is exceptionally strong among Weirton employees, who some time ago formed the Weirton Employees' Security League for the avowed purpose of combating any attempt on the part of SWOC organizers to intimidate or coerce their members into joining an outside union. In fact, in a recent parade staged by the Security League, at least 200 or more signs informed the NLRB and the SWOC to "Let them alone."

The present hearing has all the

Experience is a tremendous advantage in any sport or business. It accounts for Mr. Vanderbilt's sweeping victory in the recent America's Cup Races. It accounts in a large measure for the outstanding success of the long list of Thomson Resistance Welding Installations. For in the fifty years since Elihu Thomson invented the Thomson Process, Thomson-Gibb has led the field in pioneering and development work, has met and solved thousands of problems dealing with every phase of resistance welding. Put the advantage of experience on your side. Let Resistance Welding Headquarters help you cross the line a winner in the race for high speed, low cost production.

FLASHES, a monthly publication, keeps men responsible for production abreast of the newest developments in resistance welding methods and equipment. Would you like to receive copies?

THOMSON-GIBB ELECTRIC WELDING COMPANY

PRODUCTION WELDERS

HEADQUARTERS FOR
MANUAL AND AUTOMATIC
SPOT · SEAM · BUTT · FLASH
PROJECTION · PORTABLE GUN
AND SPECIAL WELDERS

GENERAL OFFICES 162 PLEASANT STREET
LYNN - MASSACHUSETTS
FACTORIES AT LYNN, MASS. AND BAY CITY, MICH.
BRANCH OFFICES
BALTIMORE · BUFFALO · CHICAGO · CLEVELAND · DETROIT
GRAND RAPIDS · INDIANAPOLIS · KANSAS CITY · LOS ANGELES
MINNEAPOLIS · MOLINE · LYNN · NEW YORK · PHILADELPHIA
PITTSBURGH · ROCHESTER · ST. LOUIS · SAN FRANCISCO · SEATTLE
SYRACUSE · QUEBEC · MONTREAL · TORONTO · BAY CITY

Clashes . . .

WEIRTON Steel Employees Show Their Dislike of the CIO and NLRB in a Parade of Protest

earmarks of becoming a long drawn-out affair and some observers predicting that the NLRB will be taking testimony a month or two from now.

Petroleum Equipment Exports Gain

AMERICAN petroleum machinery is finding its way in greatly increasing quantities to all parts of the world, not only to the most highly developed countries but particularly to the remote corners of the globe, according to the Machinery Division, Bureau of Foreign and Domestic Commerce.

Unlike machinery in general, which keeps principally to the well-traveled trade routes between the more industrialized countries, oil well equipment must go wherever petroleum exists beneath the earth's surface.

Worldwide industrial expansion and economic improvement are bearing heavily upon present oil supplies, it was stated, and are giving impetus to the full exploitation of known fields and to the search for new ones. Only a relatively few countries manufacture high grade petroleum well and refining equipment, and American manufacturers are obtaining a good share of the increased demand in world markets.

Exports of such equipment from the United States during the first half of this year reached record levels and totaled $16,453,988, an 81 per cent gain over the comparable shipments last year valued at $9,083,065, and 4 per cent above the previous record January-June shipments made in 1930 amounting to $15,093,620.

If you have to use a Calendar

to figure cleaning time, the pickle liquor may not be the right temperature

When you use Duriron Steam Jets, you can pull a stop-watch on the cleaning, and time it right to the second, knowing that when the work comes out that it is ready for the next operation.

Duriron Steam Jets heat quickly, circulate the liquor to prevent cold spots, and agitate it to keep the acid active. They save in cleaning time, do a better job, with less upkeep, and utilize the steam to the best advantage.

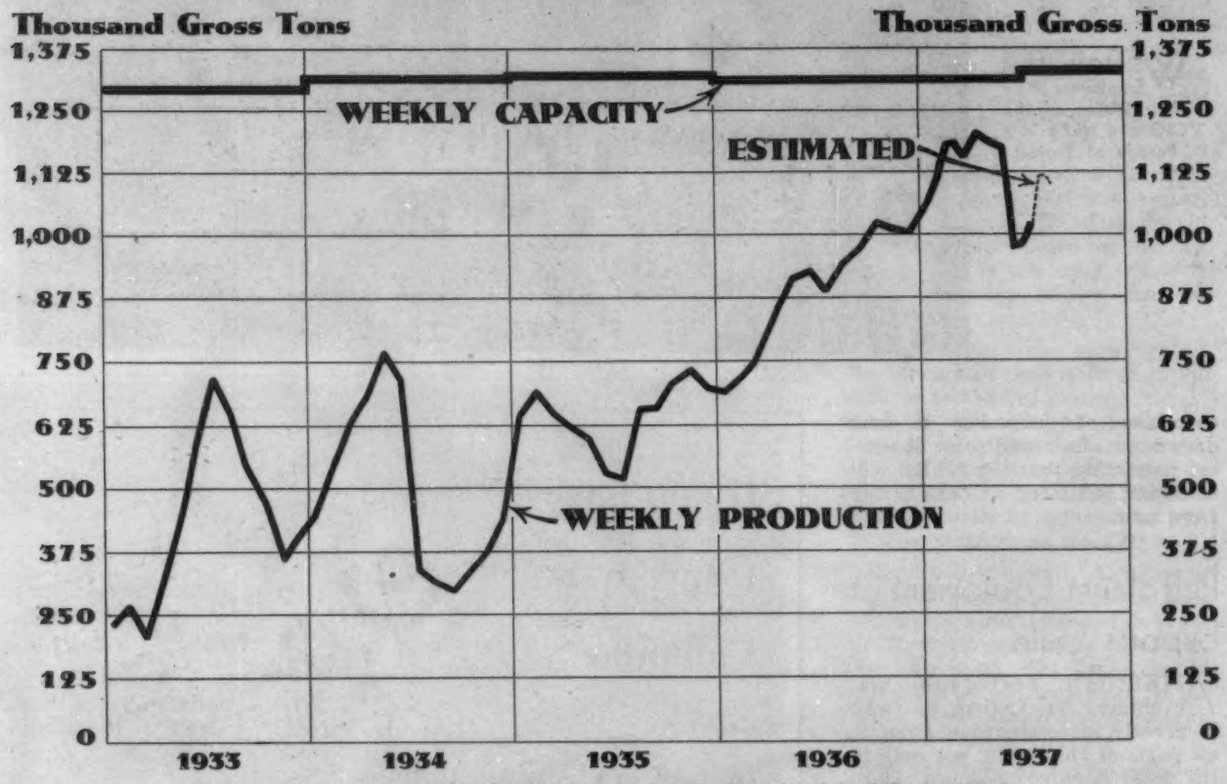
Write for technical bulletin No. 165—we shall be glad to send it to you.

THE DURIRON COMPANY, Inc.

438 N. Findlay St. Dayton, Ohio

PRODUCTION

Average Weekly Production of Open-Hearth and Bessemer Steel Ingots by Months, 1933-1937, and Estimated Production by Weeks in 1937



Figures for the Current Week Are Not Indicated on the Chart Until the Following Week

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

	Current Week	Last Week
Pittsburgh	83.0	80.0
Chicago	86.0	86.0
Valleys	80.0	82.0
Philadelphia	68.0	70.0
Cleveland	79.0	81.0
Buffalo	88.5	88.5
Wheeling	97.0	97.0
Southern	71.5	71.5
Ohio River	94.5	92.5
Western	95.0	95.0
St. Louis	81.5	86.5
Detroit	100.0	100.0
Eastern	98.0	98.0
Aggregate	83.0	83.0

Weekly Booking of Construction Steel

	Week Ended				Year to Date	
	Aug. 24, 1937	Aug. 17, 1937	July 27, 1937	Aug. 25, 1936	1937	1936
Fabricated structural steel awards	17,560	12,450	22,300	20,045	776,850	749,090
Fabricated plate awards	675	2,270	1,310	1,370	69,070	175,755
Steel sheet piling awards	4,345	525	....	....	41,155	39,100
Reinforcing bar awards	11,430	11,060	7,555	4,130	191,315	251,000
Total Lettings of Construction Steel	34,010	26,305	31,165	25,545	1,078,390	1,214,945

. . . SUMMARY OF THE WEEK. . . .

. . . Steel business gaining, but not impressively, over July totals.

° ° °

. . . Operations lower in some districts, but higher at Pittsburgh.

° ° °

. . . 16,000-ton pipe line order placed; steel scrap shows signs of weakness.

IMPROVEMENT in steel orders, noted a week ago, has not carried through in an impressive manner. While aggregate business thus far in August has been running ahead of that received in the corresponding period in July, the gain is moderate, being estimated by a leading company at 15 per cent. Most of the betterment this month has come from the automobile industry, from which larger orders are expected next month when production of new models gets into full swing.

Some of the other major industries upon which steel companies depend for a large part of their volume are showing little or no indications of a substantial pick-up. This is particularly true of the railroads and building construction. Although railroad equipment buying has been given a slight boost by the placing of 600 freight cars by the Texas & Pacific and by a number of small locomotive orders, the outlook for substantial purchases in time to become a part of steel mill schedules this year is clouded by delays in settlement of railroad wages and freight rates. Several of the railroad car shops will come to the end of their orders within a month or so unless further business develops immediately.

Building construction, although featured occasionally by a few sizable projects, is not showing marked gains in the aggregate; on the contrary, the recent volume has been disappointing to structural mills and fabricators. The week's lettings of 17,500 tons include 5200 tons for a General Motors plant at Trenton, N. J.; 4900 tons for a second section of a bridge at Port Huron, Mich., and 2000 tons for a Bendix aviation plant at Bendix, N. J. Almost half of the 15,000 tons in new inquiries is for the West Side elevated highway, New York, calling for 7200 tons. A boulevard at Rockaway Beach, N. Y., will take 4000 tons of piling.

The Government's shipbuilding program, which the steel industry hoped would get under way soon enough to aid this fall's steel volume, has been postponed at least two months because of continued labor strife.

THESE are the negative factors that must be reckoned with in any appraisal of autumn steel prospects. On the more favorable side are the probability of a large automotive output in the last four months of the year and good miscellaneous demand for steel brought about by increased farm spending power and high wage rates.

Still pointing to heavy consumption of steel, production of ingots at 83 per cent of capacity stands out as the most important element in the present situation, as there is no evidence that consumers are adding to their steel inventories, but on the contrary are reducing them, while at the same time there are no important accumulations of either semi-finished or finished steel at the mills.

Meanwhile, mills are reaching the end of their backlogs in many items, excepting plates and sheets, and from now on will be more dependent upon day-to-day business. The Ensley rail mill of the Tennessee Coal, Iron & Railroad Co. has been shut down, and other rail mills will complete their orders within a few weeks. No additional rail business of importance is in sight.

Ingot output in the Pittsburgh district has been advanced three points to 83 per cent by the starting up of a mill there, but there have been declines of two points in the Clevelain-Lorain, Youngstown and eastern Pennsylvania districts and five points in the St. Louis district, while elsewhere productio is virtually unchanged. Losses wipe out the Pittsburgh gain, leaving the estimated rate for the country unchanged from last week. A further slight decline is not unlikely before fall business attains larger volume.

ONE of the largest gas pipe line orders in some time has been placed by the United Fuel Gas Co., Charleston, W. Va.—16,000 tons of 18- and 20-in. seamless to be furnished by National Tube Co.

Pig iron contracting for fourth quarter has been substantial at Cleveland, particularly from automotive foundries, but has not expanded much in other markets.

Steel scrap at Pittsburgh has advanced 50c. a ton, reflecting sales in the past week, but the tone is now weaker, a situation also prevailing in other centers. THE IRON AGE composite scrap price has risen to $20.58.

Invoking of the Neutrality Act by the United States in the Chinese-Japanese situation would operate chiefly against Japan, as steel shipments to China have been virtually suspended. With an easing in export demand for steel, premiums ranging from $5 or $6 on finished steel to as high as $12 on semi-finished for the Far East have generally been waived by American mills.

. . . PITTSBURGH . . .

. . . Operations higher because of resumption by plant that was idle.

o o o

. . . Steel orders showing a slight gain; ahead of corresponding July period.

o o o

. . . Gas pipe line requiring 16,000 tons placed; structural awards higher.

PITTSBURGH, Aug. 24.—Resumption of operations at one steel plant this week has raised ingot output in the Pittsburgh district three points to 83 per cent of capacity, while the Wheeling district remains unchanged at 97 per cent. Minor fluctuations in steel operating rates can be expected until a heavier influx of orders from automobile manufacturers reaches producers.

Total finished steel specifications in the past week showed a further slight improvement over the previous period. In fact, one steel company reports its business so far this month ahead of the corresponding period in July. The slow improvement which has materialized in the steel markets during the past few weeks is general and is not confined to any one specific item, although the major impetus has come from heavier automotive buying. Miscellaneous demand is rather slow on the pick-up, but more activity among these sources is expected after Labor Day.

United Fuel Gas Co., Charleston, W. Va., recently placed an order in this district for approximately 96 miles of 18- and 20-in. seamless tubing involving around 16,000 tons. The line will be for natural gas transmission. There is some evidence of a slowing up in oil-country goods specifications, although current business is in fair volume and mills are still faced with backlogs running from four to six weeks.

Recent structural awards have been large and include one to American Bridge Co. of 4900 tons of material for a Port Huron, Mich., bridge.

Steel products showing least improvement include sheets and strip, but this trend is expected to be reversed in the near future by heavier automobile buying.

No. 1 steel scrap is quotable at $22 to $22.50, based on sales last week, but within the past few days the market has become more or less stationary.

Pig Iron

Producers have opened order books for fourth quarter tonnages with no change in price. New business, although comparatively light in volume, has shown further improvement. Some consumers, who had fair-sized stocks, are back into the market for iron but, with the reaffirmation of prices, no unusual rush to cover requirements is expected.

Semi-Finished Steel

Demand in the past week has shown little if any change from the previous period but total tonnages so far this month compare favorably with bookings in the corresponding July period. A slight pick up in orders for forging billets has materialized and further improvement in wire rod demand is noticeable.

Bolts, Nuts and Rivets

Specifications improved slightly during the past week. Producers are rather disappointed in the volume of incoming business during the past several weeks and are looking hopefully toward the resumption of railroad buying late in the fall. Specifications from automobile companies have been received, but so far tonnage involved is not large. Most plants have cleaned up backlogs and are working on current orders with operations not much better than 50 to 55 per cent of capacity.

Bars

Hot rolled bar specifications in the past week have shown further improvement, due almost entirely to automotive purchases. Miscellaneous demand continues fair and includes fill-in requirements from farm implement makers. With plans for 1938 model production slowly shaping up, producers expect a steady improvement in hot rolled bar demand from this source.

Cold Finished Bars

In contrast to the light demand in the past several weeks, cold finished bar specifications last week were somewhat better. Main impetus for the improvement came from the automotive industry. A fair amount of orders were received from agricultural implement and textile machinery makers. It may be significant that jobber buying has shown a slight increase as this source has been absent from the market for some time.

Steel Sheet Piling

Although large projects are lacking, a considerable number of smaller jobs have come to light in the past few weeks. Bethlehem Steel Co. was awarded the contract for 1000 tons of piling for a bulkhead at Rockaway Park, N. Y. George Pollock, Sacramento, Cal., is general contractor for the Mare Island, Cal., project requiring 10,000 tons. The contract for the piling will be awarded soon.

Plates and Shapes

Recent awards were rather impressive and included 4900 tons of plate and shapes for a Port Huron, Mich., bridge awarded to American Bridge Co., Pittsburgh; 5200 tons of material for a General Motors Corp. building at Trenton, N. J., awarded to Bethlehem Steel Co.; and 1000 tons for the Libbey Glass Co. factory building at Toledo, Ohio, to Bethlehem Steel Co. Inquiries, on the other hand, were not outstanding except for contract No. 18 covering public elevated highway, New York City, which will require 7600 tons.

Reinforcing Bars

Concrete bar awards in the past week were rather light, as were new projects. Main interest is centered on the substantial amount of tonnage to be placed for public work projects at Detroit. Rein-

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Aug. 24, 1937	Aug. 17, 1937	July 27, 1937	Aug. 25, 1936
Rails, heavy, at mill	$42.50	$42.50	$42.50	$36.37½
Light rails, Pittsburgh	43.00	43.00	43.00	35.00
Rerolling billets, Pittsburgh	37.00	37.00	37.00	30.00
Sheet bars, Pittsburgh	37.00	37.00	37.00	30.00
Slabs, Pittsburgh	37.00	37.00	37.00	30.00
Forging billets, Pittsburgh	43.00	43.00	43.00	37.00
Wire rods, Nos. 4 and 5, P'gh	47.00	47.00	47.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	2.10	2.10	2.10	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.45	2.45	2.45	1.95
Bars, Chicago	2.50	2.50	2.50	2.00
Bars, Cleveland	2.50	2.50	2.50	2.00
Bars, New York	2.78	2.78	2.78	2.30
Plates, Pittsburgh	2.25	2.25	2.25	1.90
Plates, Chicago	2.30	2.30	2.30	1.95
Plates, New York	2.53	2.53	2.53	2.19
Structural shapes, P'gh	2.25	2.25	2.25	1.90
Structural shapes, Chicago	2.30	2.30	2.30	1.95
Structural shapes, New York	2.5025	2.5025	2.5025	2.16¼
Cold-finished bars, P'gh	2.90	2.90	2.90	2.25
Hot-rolled strips, P'gh	2.40	2.40	2.40	1.95
Cold-rolled strips, P'gh	3.20	3.20	3.20	2.60
Hot-rolled annealed sheets, No. 24, Pittsburgh	3.15	3.15	3.15	2.50
Hot-rolled annealed sheets, No. 24, Gary	3.25	3.25	3.25	2.60
Sheets, galv., No. 24, P'gh	3.30	3.30	3.30	3.20
Sheets, galv., No. 24, Gary	3.90	3.90	3.90	3.30
Hot-rolled sheets, No. 10, Pittsburgh	2.40	2.40	2.40	1.95
Hot-rolled sheets, No. 10, Gary	2.50	2.50	2.50	2.05
Cold-rolled sheets, No. 20, Pittsburgh	3.55	3.55	3.55	3.05
Cold-rolled sheets, No. 20, Gary	3.65	3.65	3.65	3.15
Wire nails, Pittsburgh	2.75	2.75	2.75	2.10
Wire nails, Chicago dist. mill	2.80	2.80	2.80	2.15
Plain wire, Pittsburgh	2.90	2.90	2.90	2.40
Plain wire, Chicago dist. mill	2.95	2.95	2.95	2.45
Barbed wire, galv., P'gh	3.40	3.40	3.40	2.60
Barbed wire, galv., Chicago dist. mill	3.45	3.45	3.45	2.65
Tin plate, 100 lb. box, P'gh	$5.35	$5.35	$5.35	$5.25

On export business there are frequent variations from the above prices. Also in domestic, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

Per Gross Ton:	Aug. 24, 1937	Aug. 17, 1937	July 27, 1937	Aug. 25, 1936
No. 2 fdy., Philadelphia	$25.76	$25.76	$25.76	$21.3132
No. 2, Valley furnace	24.00	24.00	24.00	19.50
No. 2, Southern Cin'ti	23.69	23.69	23.69	19.44
No. 2, Birmingham†	20.38	20.38	20.38	15.88
No. 2, foundry, Chicago*	24.00	24.00	24.00	19.50
Basic, del'd eastern Pa.	25.26	25.26	25.26	20.8132
Basic, Valley furnace	23.50	23.50	23.50	19.00
Malleable, Chicago*	24.00	24.00	24.00	19.50
Malleable, Valley	24.00	24.00	24.00	19.50
L. S. charcoal, Chicago	30.04	30.04	30.04	25.2528
Ferromanganese, seab'd carlots	102.50	102.50	102.50	75.00

† This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent or higher.
* The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$22.25	$22.00	$20.75	$16.25
Heavy melting steel, Phila.	19.75	19.75	19.75	14.75
Heavy melting steel, Ch'go	19.75	19.75	19.75	15.75
Carwheels, Chicago	19.75	19.75	19.75	15.00
Carwheels, Philadelphia	20.75	20.75	19.75	16.25
No. 1 cast, Pittsburgh	20.25	20.25	19.75	15.75
No. 1 cast, Philadelphia	21.25	21.25	20.75	15.75
No. 1 cast, Ch'go (net ton)	16.75	16.75	16.75	13.50
No. 1 RR. wrot., Phila.	20.75	19.75	19.75	14.75
No. 1 RR. wrot., Ch'go (net)	19.75	19.75	19.75	13.75

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.35	$4.35	$4.35	$3.65
Foundry coke, prompt	5.00	5.00	5.00	4.00

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	14.00	14.00	14.00	9.75
Lake copper, New York	14.12½	14.12½	14.12½	9.87½
Tin (Straits), New York	58.875	59.75	59.12½	42.10
Zinc, East St. Louis	7.25	7.25	7.00	4.80
Zinc, New York	7.60	7.60	7.35	5.17½
Lead, St. Louis	6.35	6.35	5.85	4.45
Lead, New York	6.50	6.50	6.00	4.60
Antimony (Asiatic), N. Y.	15.375	15.25	15.25	12.50

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Aug. 24, 1937	2.605c. a Lb.	$23.25 a Gross Ton	$20.58 a Gross Ton
One week ago	2.605c.	23.25	20.50
One month ago	2.605c.	23.25	20.08
One year ago	2.159c.	18.73	15.58
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1937	2.605c., Mar. 9	2.330c., Mar. 2	$23.25, Mar. 9	$20.25, Feb. 16	$21.92, Mar. 30	$17.08, June 15
1936	2.330c., Dec. 28	2.084c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.130c., Oct. 1	2.124c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, April 23
1934	2.199c., Apr. 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., Apr. 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., Apr. 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

forcing bar specifications so far this month are running ahead of the corresponding July period.

Sheets

Although specifications from automobile makers are holding up fairly well, miscellaneous demand fell off some in the past week, with the result that aggregate specifications are not as large as in the previous period. Producers are looking for fairly substantial orders to be placed some time within the next 10 days by automobile makers. Backlogs have been further reduced but this condition may be temporary in view of impending automotive orders. Jones & Laughlin Steel Corp. will, in the near future, be in a position to supply galvanized sheets.

Wire Products

Demand for rods and manufacturers' wire has shown further improvement in the past week. Although the total volume of merchant wire business is comparatively small, requests for carload lots from numerous jobbers indicate that the latter's stocks are fairly well depleted. More active buying by the jobbing trade is possibly held in abeyance pending clarification of the differences in Northern and Southern selling prices.

Tin Plate

Tin plate operations are slightly above 100 per cent with no let-up in pressure for delivery. A fair amount of general line can business at $5.35, Pittsburgh base, for fourth quarter delivery has accumulated. Producers of roofing terne plate are now stamping all material with the weight of coating, which, in some cases, has not been the practice where private brands were involved. This procedure has been adopted for protection of the consumer.

Strip

Total strip specifications are changed but little from a week ago but the trend is slightly upward owing to bookings from automobile parts makers. Incoming business may be roughly estimated as sufficient to support 60 to 65 per cent operations. Washing machine and cash register manufacturers have been specifying recently.

Railroad Buying

Texas & Pacific have ordered 500 box cars from Pullman Standard Car Mfg. Co. and 100 hopper cars from Bethlehem Steel Co.

Tubular Goods

United Fuel Gas Co., Charleston, W. Va., recently placed an order for about 96 miles of 18 and 20 in. seamless tubing involving approximately 16,000 tons, with National Tube Co., Pittsburgh. The pipe is for a line to run from near Cedarville, W. Va., to Marjorsville, W. Va., near the Pennsylvania State line and will be for natural gas transmission. The brisk activity in oil-country goods specifications existent for the past several weeks has shown signs of slowing up but incoming business is in fair volume.

Coal and Coke

Little change is noted in beehive furnace activity except that accumulations have been further reduced and are probably at the lowest point in several weeks. Spot demand is dull and no new furnace contracts have been closed recently. Beehive furnace coke requirements may be increased soon with the possibility of one Buffalo blast furnace resuming operation and the likelihood of another furnace for the manufacture of ferromanganese starting up at Marietta, Ohio. Hearings will be held at Johnstown, Pa., in the near future to determine the question of whether or not the "captive" mines will come under the Guffey-Vinson Coal Regulation Act.

. . BIRMINGHAM . .

. . . Ensley rail mill shuts down; other operations virtually unchanged.

BIRMINGHAM, Aug. 24—The Ensley rail mill of the Tennessee Coal, Iron & Railroad Co. will be closed down this week. The mill has operated continuously since Nov. 2, and nearly 200,000 tons of rail has been rolled. It is now expected that the mill will resume production around Nov. 1.

Other iron and steel operations of the district are unchanged. Production continues steady in most all lines. Backlogs are still on hand, and there is a fair amount of new business. Cotton ties are moving freely and there is improvement in wire products and roofing sheets. Jobbers are stocking in anticipation of fall demand.

Last week eight open hearths were worked at Fairfield, four at Ensley and five at Gadsden. This week's total will be 18 to 19. Blast furnace operations remain at the high point, with all 18 in blast.

Virginia Steel Co. has booked 250 tons of bars for a State highway bridge in Georgia.

On Aug. 31 the Memphis office of the U. S. Engineers will open bids for the construction and delivery of 15 welded steel dredge pontoons.

National Cast Iron Pipe Co. has been awarded 185 tons of pipe by Santa Monica, Cal., and American Cast Iron Pipe Co. is low bidder for 150 tons at Oakland, Cal.

. . CAST IRON PIPE . .

Buzzards Bay Water District, Mass., has awarded 725 tons of cast iron pipe to French interests.

Vallejo, Cal., has opened bids on 125 tons of varied pipe.

Pomona, Kan., plans pipe lines for water system. Also elevated steel tank and tower. Fund of $35,000 is being arranged for work. Paulette & Wilson, National Reserve Building, Topeka, Kan., and Farmers' Union Building, Salina, Kan., are consulting engineers.

Worland, Wyo., plans quantity of 6, 8 and 10-in. for extensions in water system. Bond issue of $60,000 has been approved for this and other waterworks installation. George M. Donnell, Worland, is consulting engineer.

Tenino, Wash., will take bids soon for pipe lines for water system and other waterworks equipment. Cost about $50,000. Financing has been arranged through Federal aid. Parker & Hill, Smith Tower Building, Seattle, are consulting engineers.

Board of Trustees, Waterford Township, Pontiac, Mich., plans pipe lines for water system in Huron Gardens district, near Pontiac. A bond issue of $120,000 will be arranged for this and other waterworks installation in that area.

Escondido, Cal., plans pipe lines for water system and other waterworks installation. A special election has been called on Sept. 14 to approve bond issue of $48,000 for project.

Bloomfield, Iowa, asks bids until Aug. 31 for 2800 ft. of 8-in., with fittings, valves and other waterworks equipment, including two centrifugal pumps and accessories. M. G. Hall, Centerville, Iowa, is consulting engineer.

Portsmouth, Ohio, plans extensions in pipe lines for water system in vicinity of Second and Custus Streets. Cost about $41,000.

Mentor, Ohio, plans pipe lines for extensions and replacements in water system. A $100,000 bond issue is proposed for this and other waterworks installation. P. W. Elwell is city engineer.

Grafton, W. Va., plans main pipe line from Tygart Valley dam to municipal water station for trunk water supply. Cost about $15,000.

Electra, Tex., plans pipe lines for extensions and replacements in water system. Fund of $70,000 is being arranged through Federal aid for this and other waterworks installation. J. E. Ward, Harvey-Snider Building, Wichita Falls, Tex., is consulting engineer.

Rensselaer Water Co., Rensselaer, N. Y., plans new 20 and 14-in. for main water supply lines; also new dam and reservoir, and other expansion and improvements in system. Entire project will cost close to $500,000. R. E. Wheeler is company engineer.

. . . . CHICAGO . . . .

. . . Steel production unchanged at 86%; sales fail to make much further gain.

o o o

. . . Most of the betterment thus far is due to automobile industry.

o o o

. . . Not much further buying of cars and rails by railroads expected.

CHICAGO, Aug. 24.—Ingot production this week continues unchanged at 86% of capacity, thereby extending to two weeks in succession a rate of output equal to the highest for the recovery period prior to the strikes.

Sales last week were about in line with those in the week preceding and close to the average for the last month or so. A few increases were reported in some products on which orders have started to come in from the automobile industry, but the betterment from this source was not large enough to raise the aggregate appreciably. The industry is getting started on new model production at a later date than had been expected in many quarters earlier in the year.

Incoming business in general still is running well behind shipments. The automobile manufacturers, who are counted on to close the gap, should increase their purchases steadily from this point and get into large scale buying by early September, most mill operators now believe. Meanwhile, the farm implement and tractor manufacturers continue to take heavy tonnages with no early let-down in sight. Hopes gradually are waning, however, that the railroads will do much additional secondary car and rail buying this year.

No change has occurred in the quiet condition of the scrap market here in the past week, it now being three weeks since the last sale to a local mill. The nominal quotation for No. 1 steel is unchanged at $19.50 to $20.

Pig Iron

Opening of fourth quarter books with no change in prices last week removed any incentive to buying in anticipation of an increase, although little of such purchasing had been in evidence. Shipments to foundries casting automobile parts are beginning to pick up as they swing into production for 1938 models. An increase also is being noticed in shipments to foundries casting for the stove and other heating equipment manufacturers in line with the seasonal upturn in their activity. Coke shipments so far this month are up moderately compared with the like period in July, reflecting a slight increase in the total melt.

Plates

New plate business is coming largely from tank and boiler fabricators. It is insufficient, however, to match shipments, which still are continuing in sizable volume, including some tonnages to freight car builders for the tail end of this year's car building programs and some to structural fabricators. Backlogs remain large enough to hold delivery promises in a range up to 10 weeks, but there is evidence of further easing of the situation that will allow some shipments in about half that time when necessary. Freight car makers, it is estimated, can wind up production on most of their present orders within 30 days. Texas and Pacific has ordered 500 box cars fromPullman Standard Car Mfg. Co. and 100 hopper cars from Bethlehem Steel Co., and there is an inquiry out for 50 box cars and 25 gondolas for the Missouri-Illinois Railroad.

Rails

Wage increases granted by the railroads have dispelled most hopes of steel producers in this area that much additional secondary rail buying will materialize this year. Rail backlogs are down to a point where they can be cleaned up in another month, although, it is hoped, some additional buying will extend this period. The only new order reported in the district last week was 500 tons for a western road. Buying of track accessories, while not large, is reported fair for this season of the year.

Wire Products

Automobile manufacturers are working on schedules for 1938 models and orders from this important outlet should follow soon. The outlook for jobber demand continues highly encouraging as the active fall season approaches. Exceptionally favorable crop prospects are expected to make for a heavy demand for farm wire products. Demand for wire rope is holding to satisfactory levels with the continuance of good buying for drilling operations in the oil country.

Bars

Bar business is starting to pick up with a gain in orders from the automobile manufacturers. The implement and tractor makers are still taking large tonnages and probably will continue heavy consumers inasmuch as they show no indications of an early let-down from near-capacity operations. Demand from the latter outlets for bar steel has helped materially to retard the reduction of backlogs in that product while automobile industry buying has been curtailed.

Sheets and Strip

Large scale buying by the automobile industry still is awaited for rebuilding of sheet and strip backlogs which continue to be reduced. Placement of orders by this leading consumer of flat rolled products has started and is gaining, but at a later date than had been generally expected earlier in the year. Producers look for a steady increase over the next two weeks.

Reinforcing Steel

Reinforcing steel inquiries and awards in the past week have been fairly numerous, but generally in less than 100-ton lots. Dean Steel Co. was awarded 266 tons for the Albert Schwill & Co. malt house addition in Chicago.

Structural Shapes

Structural inquiries continue for the most part in small individual tonnages, one producer reporting that an aggregate of 12,000 tons is accounted for by 150 separate lots. Awards in the last week totaled about 5000 tons. Bids went in the first of this week for 1200

tons for the Allis-Chalmers buildings at Milwaukee, with announcement of the award promised in a few days. Bids on 2100 tons for a plant of the same company at La Crosse, Wis., are called for on Aug. 30.

Lucy Furnace Being Scrapped; Built 1871

THE historic Lucy blast furnace, owned by the Carnegie-Illinois Steel Corp., is being dismantled after 65 years of service to Pittsburgh's steel industry.

Named for the wife of Thomas M. Carnegie, one of the founders of the Carnegie company, the original Lucy furnace was built in 1871 and was first operated on May 18, 1872. Having outlived its usefulness, the furnace has been idle since April 30, 1929.

As one of the first operating units of the early Kloman, Carnegie & Co., Lucy furnace was built at Fifty-first Street, Pittsburgh, at the same time as its early rival, Isabella furnace, was being constructed directly across the Allegheny River.

Originally both Lucy and Isabella furnaces were 75 ft. in height and of 20 ft. bosh diameter. Both went into blast about the same time in the early summer of 1872, each with a daily production of 50 tons of pig iron. Keen rivalry on output featured the early operation of the furnaces. THE IRON AGE in 1873 estimated the capacity of Lucy furnace as "about 550 tons a week." Lucy made 87 tons in a day and 578 tons in a week as her record in 1873. During the early part of 1874 the Lucy kept ahead of Isabella, and in February produced 593 tons; but by August she was overtaken by the Isabella's 612 tons. In October the Lucy shot ahead with 642 tons, and by the twenty-fourth of that month the Isabella had almost caught up, 651 against the Lucy's 653. On that day the Lucy for the first time produced over a hundred tons, and the achievement was "heard with incredulity by the iron trade."

The race between the furnaces continued until 1881 when in February Isabella made 1000 tons in a week, and in October 1438 tons, the Lucy dragging behind with an average weekly output of about 1000. Lucy furnace soon thereafter produced 300 tons daily.

Lucy furnace No. 2, which is also being dismantled was "blown in" Sept. 27, 1877, and was "blown out" on Sept. 19, 1930.

"Labor Notes"

READERS of THE IRON AGE will be interested in the observations recently made in Printers Ink by its president, Roy Dickinson, under the heading of "Labor Notes." Mr. Dickinson is a "liberal" who mixes his liberality with common sense. He has followed labor relations for many years, was a delegate to the Harding Unemployment Conference in 1921, has kept closely in touch with employer-employee relations ever since and has dealt constructively with them week by week in his publication. Here is what he thinks of some present developments:

"There has been talk of the British trade union act passed about 10 years ago. Many commentators are saying that labor ought to be made to incorporate. The point is that they do not incorporate in England, but have a system of voluntary registration. More than 14,000,000 British workers belong to unions as compared with the 5,000,000 or 6,000,000 here. Nobody will know how many members there are in the CIO, for example, until the parent organization starts to collect dues from members regularly.

"It is true that in Great Britain the closed shop does not predominate nor does it use the check-off. It is illegal for a manufacturer to make deductions from workers' pay except for unemployment, health insurance and old-age pensions. It is very doubtful whether the present demands of some CIO leaders for the check-off will get very far. It is certainly no step toward greater democracy in industry.

"Five things seem to me to be needed in this country for placing more responsibility on labor: 1. Creating of special machinery for compulsory arbitration and acceptance of the decision when reached. 2. A legal definition that some strikes are illegal and that the interests of the public are superior to the interests of any special group. 3. Some sort of legal responsibility for the proper conduct of unions with reference particularly to the carrying out of contracts after they are made, either verbally or signed. 4. The prohibition of assessments on union members for political purposes. 5. The prohibition of sit-downs and mass picketing which prevent entrance to plants.

"At the present time in this country a union must tell to what political party it contributes and how much; and anyone can find out the facts by going to the proper bureau in Washington. A union, however, can assess its members for funds to use politically.

* * *

"Speaking of incorporation of unions, there is a very interesting case in Washington right now in which a big bakery is suing two unions under the Clayton Anti-Trust Act, charging breach of contract. This case cuts across the whole present wage and hour controversy because the unions were trying to maintain the good wage standards in Washington by opposing the sale of goods from low-cost and low-priced bakeries without the city. They struck against a bakery which they claim was acting as jobber for out-of-town manufacturers with low wage scales.

"They claim they have the right to protect themselves and the manufacturers with whom they have signed contracts against unfair competition from cheaper labor outside. In this particular case it is said that the unions may incorporate as a means of avoiding liability. That case will be one well worth watching for men interested in the future of labor relations in this country.

* * *

"I have been asked by several manufacturers recently whether I thought the American Federation of Labor is on the way out. I most definitely do not. Many of the A F of L people think, as does much of the general public, that John L. Lewis hit his peak some months ago and that from now on the manufacturers will be more likely to deal with conservative groups, especially if the employees demand it. There is an important labor decision to be made on the question as to whether a manufacturer can ask an A F of L union to come in and organize his plant for the purpose of collective bargaining without first holding an election to see which, if either, his employees want.

* * *

"The main objections to the present wage and hour bill come from large manufacturers and conservative labor people who don't want to see the creation of any more boards. I talked to several men who have been in the labor movement for many years and are not alarmists. They pointed out that Mussolini employed a man named Rossini, who was formerly an IWW leader here, to replace the old independent trade union movement with a semi-official labor body. Several of them think that John L. Lewis has been working along these lines with the backing of the Administration.

. . PHILADELPHIA . .

. . . District operations down two points to 68 per cent.

o o o

. . . Budd buys 500 tons of stainless for Sante Fe cars.

o o o

. . . Backlogs continue to drop as new buying lags.

PHILADELPHIA, Aug. 24.—All market signs are in accord that the low point of the summer recession in steel orders is at hand. Backlogs are sliding off at a slower pace, a number of consumers and warehouses have worked off the bulk of abnormal stocks, some heavy automobile purchases have been placed on books, and the prosperous condition of farmers is expected to help the Middle Western mills directly and thus local producers indirectly by keeping some competition out of this district.

Perhaps hope has engendered the belief, but every seller here looks for a surge of new business after Labor Day which will continue on through the turn of the year and thereby give producers one of the most successful years in history. Negative factors are the probable absence of important railroad buying through the remainder of 1937 and the very probable absence of sizable orders for structural shape mills. Anticipating a jam in specifications during September, some mills are encouraging their customers to enter monthly cancellation contracts, but response to this suggestion has not been very marked because many officials are on vacations and the reaffirmation of prices has lulled others into a sense of security.

Mill activity here has undergone little change despite the easier condition in order books. One producer intends to shut down its plate mill next week for much needed repairs, and another is currently stocking ingots in a moderate way. Various changes in open hearth operations have resulted in a net drop of two points, thereby establishing the average district rate at 68 per cent for the current week.

Pig Iron

Although district producers have reaffirmed prices for fourth quarter, they all have taken pains to point out that prices could be advanced with little or no notice sometime during the quarter. This implication has failed to move consumers, and so far new ordering has been desultory. Consumers in this area are quite active, however, and have worked off yard stocks to a considerable extent, thereby leading to the belief that a sizable amount of business will come up for consideration during September. Furnace stocks are at a minimum level, and should England, or some other country, come into the market for additional orders later in the year, as consumers there have indicated on several occasions that they would, there is a good chance that domestic consumers might find it difficult to secure satisfactory deliveries during fourth quarter. Pipe makers in this area will not be much of a factor for at least several months, as they all have considerable stocks of foreign iron yet to work off. On the other hand, stove and heater foundries are entering a more active period, and their orders are more plentiful.

Sheets and Strip

The Budd company this week ordered 500 tons of stainless steel in anticipation of an order from the Santa Fe Railroad for a number of new cars. Budd will order 5000 tons of sheets this week for initial runs on 1938 automobile models. Tentative orders have been placed for 75,000 tons of frame stock for delivery over the next 12 months, and work on this Chevrolet job commences within a week. The Heintz company has 500 men back to work and is operating one full shift, despite the activities of strike pickets. This company is slowly catching up on delayed orders and should be considering new steel purchases in the near future. Fabricators of light tanks are busier and are ordering larger quantities of sheets, but other sheet outlets have not been as active as had been expected and more than one producer has expressed disappointment over the total volume of August bookings to date. Currently, sheets are available here in three to four weeks, but at least one Middle Western producer continues to quote seven weeks on hot rolled, six to seven weeks on light cold rolled and 12 to 13 weeks on annealed stock.

Plates and Shapes

Sellers of shapes are discouraged by the recession in demand. Although mill prices remain firm, fabricator bids have on some jobs been wabbly as different shops compete for the small amount of work coming into the market. The largest award of the week was the 5000 tons of shapes and 200 tons of bars for the General Motors building at Trenton, which went to Bethlehem Steel Co. Other awards include 320 tons for a Pottstown, Pa., bridge to Bethlehem, and 115 tons for a warehouse at Lancaster, Pa., which went to A. B. Rote Co. New work up for bidding is a 300-ton high school at Wilmington and a 1000-ton coal breaker for the Glen Alden Coal Co.

Plate specifications, although still very poor, have shown an improvement over the previous week and have been coming in from all directions. Although local mills expect a marked improvement in orders during the fall, no seller looks for the activity to match that of the first and second quarters. Universal plates can now be had in two weeks and sheared plates are available in three to four weeks.

Wire Products

Jobbers have worked off the abnormal stocks of last spring, but new ordering has yet to shake off its seasonal inertia. Strip deliveries are down to six weeks or better, and the typical schedule on round wires is one to two weeks, unless considerable annealing is involved, in which case an additional week is required. Merchant products are being shipped from mill stocks immediately.

Imports

The following iron and steel imports were received here during the past week: 4512 tons of manganese ore and 4709 tons of chrome ore from Cuba; 3221 tons of chrome ore from South Africa; 25 tons of ferromanganese from Norway; 1 ton of steel billets, 7 tons of steel forgings, 15 tons of steel tubes, 28 tons of wire rods and 19 tons of steel bars from Sweden; 8 tons of steel bars, 64 tons of structural shapes and 20 tons of steel bands from Belgium, and 1 ton of steel bands from France.

Texas & Pacific has ordered 500 box cars from Pullman Standard Car Mfg. Co., and 100 hopper cars from Bethlehem Steel Co.

Board of Transportation, City of New York, has awarded an order to American Car & Foundry Co. in conjunction with Pullman Standard Car Mfg. Co. for 100 passenger cars.

Utah Copper Co. has ordered 15 dump cars from Austin-Western Road Machinery Co.

Atchison, Topeka & Santa Fe has ordered the following equipment: two diesel-electric locomotives from Baldwin Locomotive Works; three from American Locomotive Co. and six from Electro-Motive Corp.

South Buffalo has ordered six diesel locomotives from American Locomotive Co.

Philadelphia, Bethlehem & New England has placed an order for four diesel locomotives with Electro-Motive Corp.

Patapsco & Black Rivers has ordered six diesel locomotives from American Locomotive Co. and two from Electro-Motive Corp.

Elgin, Joliet & Eastern has placed orders for two diesel locomotives with American Locomotive Co. and five with Electro-Motive Corp.

. . . Slackening in steel orders has not affected production.

BUFFALO, Aug. 24.—A reported slackening of new steel orders has not had any immediate effect on Buffalo open hearths which continue to operate as follows: Bethlehem's Lackawanna plant, 28; Republic, seven and Wickwire-Spencer Steel Co., two.

The Montour Falls, N. Y., railroad viaduct job involving 500 tons finds A. S. Wickstrom, Bound Brook, N. J., low general bidder. A school job in Chaumont, N. Y., will require 100 tons of structural. One hundred tons of eight-foot steel pipe will be required for Division 14, the outfall conduit into the river for the Buffalo sewage disposal plant. McLain Construction Co., Buffalo, is low bidder. An addition to the Buffalo plant of the Washburn-Crosby Co. will require 185 tons of reinforcing bars.

Special Session of Congress May Be Called to Consider Wage-Hour Bill

WASHINGTON, Aug. 24.—The city was returning to normalcy on Monday with legislators departing in droves, leaving behind a Congressional record covering more than seven months of "spending much and doing little."

The closing hours of the session on Saturday found John Lewis and William Green, current headliners on the labor front, agreeing that Congress had erred in failing to pass the Administration's wage and hour bill which died in the House Rules Committee. Their eleventh-hour appearance in support of the bill, which admittedly was as ineffective as if they had appealed for passage after adjournment, was regarded as verifying reports that labor did not want the bill passed.

It was the first time Lewis had broken his silence on the measure for months. Green had entered the picture conspicuously a few weeks ago but his interest in the matter was revitalized, it is believed, because of Roosevelt's insistence that the Black-Connery bill pass during the session.

The opinion is being expressed by some Congressmen that a wage and hour bill will be the first order of business next session while others say the President may call a special session about Nov. 1 to consider wages and hours legislation, farm relief and possibly Government reorganization. That was the forecast made by Representative J. E. Miller, of Arkansas, when he emerged from a White House conference with the President on Monday.

Democrats Assail CIO

At least two Democrats took time out of a busy closing session on Saturday to assail John L. Lewis and his CIO. Representative Cox, of Georgia, said the CIO chieftain is "smarting under his failure to win the 'little steel' strikes" and is planning a general strike in retaliation.

Senator Edward R. Burke, of Nevada, bitter foe of the President's court-packing plan, charged that Lewis had retarded labor's cause and that it will never regain public support by following "along the lines which he set down during recent months." These statements followed the announcement earlier in the day from Harrisburg, Pa., that the CIO Generalissimo would take the air on Sept. 3 to discuss the steel strike situation.

Earlier in the week, Representative Clare E. Hoffman, Republican of Michigan, cited the Labor Board-Wierton Steel hearing as one reason why the board should be refused an appropriation of $1,735,000. "Think of it," he said, "the board charges the company is guilty of unfair practices under the Wagner Act and as evidence cites the growth and prosperity of the community and the making of charitable gifts. Only since the enactment of the Wagner law have acts of kindness, of generosity, and of charity become unfair labor practices."

Two Committees at Work

Congress left behind a score of Congressional committees which are authorized to continue investigations through the recess. Among these are the La Follette Civil Liberties Committee and the Senate Railway Finance Committee, which has tentatively set hearings for October on legislation to regulate railroad holding companies. The La Follette committee, which spent $40,000 at the rate of $8,000 a month earlier in the session, has been fortified with $35,000 more to scrutinize charges of strike-breaking, labor espionage and collective bargaining violations. Like the Labor Relations Board, it is understood the committee has on hand hundreds of complaints to follow up.

With Congress out of the way, the news spotlight will be turned on the White House and State Department because of the tense situation in the Far East. Banning of shipments of munitions to the two warring countries, will depend upon whether China and Japan sever diplomatic relations, President Roosevelt said at a recent press conference. He said the whole thing was on a 24-hr. basis, explaining that the situation was being watched closely and subject to change daily.

Net earnings reported by Youngstown Sheet & Tube Co. for the 12 months ended June 30, after all deductions including provisions for the surtax on undistributed earnings, were $14,303,177. Gross sales, less discounts, returns and allowances, totaled $151,009,760 for the period.

. . . CLEVELAND . . .

. . . Improvement in steel business slight; comes mostly from automobile industry.

o o o

. . . Backlogs disappearing in some products; operations are being curtailed.

o o o

. . . Considerable pig iron sold for fourth quarter; ore shipments continue large.

CLEVELAND, Aug. 24.—The better demand for finished steel reported last week is being maintained, although the improvement still is rather slight. The volume of business in sheets, strip steel and alloy steel from the motor car industry was increased during the week by the purchase of some sizable lots. With this exception, there is little evidence of a further increase in business.

A further step-up in the demand from the automobile industry is expected shortly when motor car manufacturers get ready for good production schedules on new models.

A leading steel maker reports that its orders this month have gained 15 per cent over July. Shipments still exceed incoming business and backlogs of some products have about been wiped out.

With a further decline in unfilled tonnage, ingot output is down two points this week in both the Cleveland-Lorain and the Youngstown districts, being 79 per cent in the former and 80 per cent in the latter.

Most consuming industries, particularly makers of refrigerators and other household equipment, have maintained good operations through the summer and considerable of the steel that is now being ordered by these and other industries is to replenish depleted stocks.

The gain in business has not been felt in structural shapes and plates, which are still quiet. While the larger fabricators still have a good amount of work, some of the small fabricating shops need orders. Railroad buying is negligible. Mills can now make good deliveries on all products except plates and some grades of sheets.

Considerable pig iron has been sold for the fourth quarter following the reestablishment of prices for that delivery and producers expect to have comfortably filled order books when the buying is completed.

Lake ore shipments are being maintained at a high rate, and previous records for water movement may be broken in August.

Pig Iron

Sales in good volume have been made since present prices were reestablished a week ago for the fourth quarter. Purchases have been made both by large consumers in the automotive and other fields who have contracted for sizable lots and also by small foundries. Considerable additional business is still pending. Sales evidently are being stimulated by the improbability of lower prices and the possibility of an advance during the fourth quarter. The size of orders indicates that purchasers look for good foundry operations during the remainder of the year. Prices of Ohio silvery iron and Bessemer ferrosilicon have been reaffirmed for the coming quarter.

Sheets and Strip

New business in sheets increased the past week, the gain being largely due to the placing of some fair lots for new models by General Motors units covering requirements extending into October. Local stamping plants are still taking sheets for parts for 1937 models of one low price automobile. Orders in fair volume continue to come from refrigerator, stove and washing machine manufacturers. Demand is light from the building industry. Strip also is more active, some new specifications for hot rolled material having come from non-integrated cold rolling mills, and producers have taken additional orders for both hot and cold rolled strip from some of the automobile parts makers. Stainless steel strip is in good demand.

Iron Ore

Consumption of Lake Superior ore in July amounted to 5,236,487 tons, an increase of 596,754 tons over June when consumption was curtailed by strikes in some of the steel plants. The July melt was 103,438 tons less than during May but, with more furnaces operating at the start of August than at the beginning of July, the August melt is expected to show quite an increase. Ore consumed in July last year amounted to 3,826,050 tons. Furnace stocks Aug. 1 were 25,299,841 tons and stocks at furnaces and Lake Erie docks were 29,151,257 tons, a gain of 4,756,279 tons over July 1. There were 155 furnaces in blast using Lake ore on July 31, a gain of 10 for the month. The list of furnaces on which the consumption reports are based has been reduced by two to 189 because of the dismantling of two Carnegie-Illinois Steel Co. stacks at Pittsburgh.

Wire Products

A slight improvement is in evidence which is taken as an indication of the start of an upward seasonal trend. Jobbers are placing small orders to replenish broken stocks. Demand for bead wire from the tire companies has picked up. Business in fair volume is coming from bolt and nut manufacturers for wire and wire rods. Makers report a good demand for stainless steel wire.

Bolts, Nuts and Rivets

Demand for bolts and nuts from the automotive industry has become slightly more active and jobbers have commenced to place fall orders. Rivet orders this month are better than in July. Fourth quarter prices on these products have not yet been named.

Bars, Plates and Shapes

Merchant bars are moving better than early in the month, but shipments are still heavier than incoming orders and some makers have curtailed production. Forge shops and agricultural implement manufacturers are supplying some new orders. While business is still light from the automobile industry, there has been quite a pick-up in

orders for alloy steel from that source. Shapes and plates are quiet. Structural inquiry is light and some of the smaller fabricating shops have their backlogs well cleaned up. The General Electric Co. has placed 225 tons for a building in Niles, Ohio, and the Owens-Illinois Glass Co. has taken bids for 410 tons for a building in Newark, Ohio. With a grant of Federal funds, the construction of the Main Avenue bridge in Cleveland seems assured, but bids probably will not be taken before spring. This job is expected to require 5000 tons of structural shapes. Business in reinforcing bars remains light, with demand confined to small lots.

REINFORCING STEEL

. . . Awards of 11,430 tons —4195 tons in new projects.

AWARDS

Cambridge, Mass., 400 tons, office and laboratory building for B. B. Chemical Co., to Joseph T. Ryerson & Son, Inc., Chicago.

New York, 200 tons, west side warehouse, New York Central Railroad, to Truscon Steel Co., Youngstown.

Queens, 150 tons, highway project, to Concrete Steel Co., New York.

Queens, 750 tons, sewer project, to Igoe Brothers, Newark, N. J.

Trenton, N. J., 200 tons, General Motors Co. office and manufacturing building, to Bethlehem Steel Co., Bethlehem, Pa.

Baltimore, 300 tons, back river sewage disposal plant, Eastern Avenue extended, to Bethlehem Steel Co.

Wilmington, Del., 100 tons, maternity hospital, to Bethlehem Steel Co.

Detroit, 300 tons, Chrysler Motors, to Truscon Steel Co., Youngstown.

Chicago, 266 tons, Albert Schwill & Co. malt house addition, to Dean Steel Co.

Chicago, 110 tons, De Paul University, to Calumet Steel Co., Chicago.

Dayton, Ohio, 350 tons, new building, Frigidaire division, General Motors Corp., to Bethlehem Steel Co., through Charles H. Shook, Inc., Dayton, Ohio, general contractor.

Los Angeles, 6575 tons, U. S. Engineers project, to Soules Steel Co., Los Angeles.

Los Angeles, 500 tons, Vigma Street grade separation, to Ceco Steel Products Co.

Monterey County, Cal., 240 tons, reinforced concrete bridge, to Consolidated Steel Corp., Los Angeles.

Austin, Texas, 500 tons, Colorado River reclamation project, to Tennessee Coal, Iron & Railroad Co., Birmingham.

Moxie City, Wash., 218 tons, Yakima-Roza project, to Knoxville Iron Co., Knoxville, Tenn.

Ontario, Ore., 270 tons, subway construction, to Truscon Steel Co.

NEW REINFORCING BAR PROJECTS

Boston, 500 tons, Northeastern University engineering building.

New York, 477 tons, superstructure, West Side elevated ramp, contract No. 18, president, borough of Manhattan; bids until Sept. 2.

New York, 375 tons, toll booths and administration building, Henry Hudson bridge.

Queens, N. Y., Forty-sixth Avenue sewer.

Oldham, Ky., 250 tons, State prison.

Indianapolis, 225 tons, International Harvester Co.

Park Ridge, Ill., 125 tons, water reservoir.

Columbus, 225 tons, Tuberculosis hospital for State of Ohio.

Helena, Mont., 126 tons, five bridge projects; bids Aug. 27.

San Francisco, 1504 tons, viaduct for San Francisco-Oakland Bay Bridge, Eaton & Smith, general contractors.

San Francisco, 390 tons, Golden Gate Park sewage plant, Clinton Construction Co., general contractor.

CANADA

. . . Seven - months' ingot output of 836,000 tons almost equals 1929 record.

TORONTO, Aug. 24.—New business is showing improvement in the Canadian iron and steel markets. The upswing in steel production is indicated by the total for the first seven months of the year when steel ingot output reached 836,000 tons compared with the peak record of 867,000 for the corresponding period of 1929. July output of ingots almost doubled that for the corresponding month of 1936 while pig iron production in July more than doubled that for July last year. Building permits in Canada for the first seven months of 1937 exceeded those for the corresponding period last year by 42.9 per cent, totaling $33,378,744. Other business barometers also reveal improvement over previous years since 1929, and interests associated with the steel industry predict that this year may equal and in some respects pass the record year of 1929. Export demand for iron and steel and their products is increasing steadily and large shipments have been made to Great Britain and the British Dominions.

Demand for pig iron is showing steady improvement with sales for the week somewhat in excess of 1500 tons. Inquiries are more numerous. Current demand is mostly for spot delivery. Local blast furnace representatives look for speeding up in the daily melt and increased contract placing for last quarter. Prices are firm and unchanged.

Iron and steel scrap markets are creating special interest. Consuming interests are in the market for scrap and dealers are having difficulty in meeting demands for such grades as heavy melting steel, machinery cast, stove plate, rails and malleable. Other lines are becoming more active. Automobile scrap is being shipped to the United States. Some dealers are preparing new price lists and figures will be released within a few days.

.GREAT BRITAIN..

. . . Market characterized by good demand and inadequate supplies.

LONDON, Aug. 24 (*By Cable*).—The British iron and steel market is still characterized by excellent demand and inadequate supplies. The Cleveland steel works are resuming operations after the holiday week. Pig iron makers are doing their best to meet export demands. Higher pig iron prices later in the year are quite possible, and makers are already inserting a protective clause in home sales contracts. Additional hematite blast furnace was blown in at Normanby by Pease & Partners.

Mediterranean freight rates are rising, and it is feared this may affect imports of iron ore.

Lord Nuffield, head of Morris Motors, Ltd., has accused British steel makers of demanding excessive prices. Rumors of a further advance in British steel prices before the end of the year are deprecated in well informed quarters, although it is admitted that certain small adjustments may be made.

The fighting in Shanghai is an adverse factor, but works are benefiting owing to the additional supplies allotted for the British market. The South Wales tin plate market is steady to firm with a slight all-around improvement in demand. Unfortunately most inquiry is for nearby delivery. Makers are handicapped by the steel shortage and threat of labor trouble in their works.

The galvanized sheet market is dull.

The Continental steel market is still rather quiet.

. . . . NEW YORK. . . .

. . . Premiums on semi-finished and finished steel for export disappearing.

o o o

. . . Volume of new domestic business is disappointing to mills.

o o o

. . . Upward of 7000 tons of steel required for elevated highway, New York.

NEW YORK.—Orders for finished steel thus far in August have held at about the July level. While there have been signs here and there that seemed to indicate improvement, these have not carried through in an impressive manner. There is some disappointment among sellers that the expected autumn upturn has not yet made its appearance in unmistakable fashion.

Some mills are getting anxious for business in certain lines, and this has made itself particularly noticeable in export trade. Within the past week or so the premiums that were asked for and obtained on Far Eastern business have been waived. These premiums ranged from $5 or $6 a ton on finished products to as much as $12 a ton on semi-finished. Now most mills are willing to take business at domestic prices, though few, if any, quotations below the domestic level have been made.

In the construction field there is no widespread activity, but a few sizable jobs have appeared, among them contract No. 18 for the West Side elevated highway, calling for 7210 tons of plain structural steel, 293 tons of silicon steel, 96 tons of cast steel, 212 tons of cast iron and 477 tons of reinforcing bars. Bids will be received at the office of the president of the Borough of Manhattan up to Sept. 2. Bethlehem Steel Co. has been awarded 4000 tons of steel sheet piling for the Beach Channel Drive in Queens.

Pig Iron

New business continues slow and spotty, the reaffirmed prices apparently having had no effect on buying activity other than giving consumers further opportunity to size up the fall's prospects before contracting for their iron requirements. An improvement is noticeable in foundry melting operations, particularly in the jobbing field, and buyers are asking for shipping dates on iron they had previously requested held up. Shipments against contracts are maintained in undiminished volume and do not permit furnaces to accomplish much toward replenishing stocks. Water shipments from Buffalo, which have been delayed to free all the iron possible for current shipments, are slated to start down the river in earnest during the next few weeks. Approximately 60,000 tons will be moved in the next three months. Foreign inquiries from Scandinavia, England and Central Europe, for moderate tonnages, have been reported. Export shipments, though on a small scale, are consistent. Japan has lifted import duties on iron and steel to encourage imports, but the difficulty of securing the necessary governmental permission to finance such purchases is hindering buying.

Plates and Sheets

New plate business is spotty. Some domestic tank builders have recently entered the market and are expected to be a sustaining factor for the next few months when oil burner sales are at a peak. New buying is expected daily on the part of local shipyards following the settlement of strike difficulties last week. Railroad equipment activity is light, and no new car buying on an extended scale is expected this year. On the strength of recent orders, the American Locomotive Co. has entered a shop order for 25 switching diesel locomotives.

While the low point in sheet orders was passed in the early part of the month, the market is featureless, except that the demand for shipments on old orders is somewhat more persistent than it has been in recent weeks. Jobbers' stocks are high and incentive is lacking, with delivery promises unchanged and fairly prompt.

. . . . ST. LOUIS. . . .

. . . A fair upturn in buying of steel.

ST. LOUIS, Aug. 24.—Apparently the seasonal low for iron and steel purchasing has been bridged, the past week or ten days having witnessed a fair upturn in ordering of a variety of commodities. Among the items exhibiting returning life are wire and wire products, tubular goods, galvanized sheets and tank plates. Tin plate continues active, also enameling stock, on which deliveries are still considerably in arrears. There is still a lull in structural business, jobs appearing being all of small size, with the total tonnage not impressive. However, outlook is more hopeful, both for public and private work, in the early fall. Backlogs accumulated by the structural steel fabricators during the recent strike are being worked off, and operations are approximately at two-thirds of capacity.

Reaffirmation of current pig iron prices for fourth quarter delivery has resulted in no notable change in the situation. Most of the important melters are well covered through the present quarter and well into the final three months. However, the heavy consumption during the summer has cut heavily into stocks, and certain interests find they underestimated in prior calculations. August shipments will about equal those of July, and represent the largest August aggregate since 1929. The melt holds up well, particularly among the steel castings plants and such specialty makers as of stoves, farm implements and railroad equipment. Exceptional yields and prospects for crops in this area are reflected in record demands upon makers of all descriptions of farm equipment. Jobbing plants are operating at from three to five days per week.

...Sheet sales show further gain.

CINCINNATI, Aug. 24—With a further rise in steel ordering the past week over the preceding period, the upward trend is apparently reestablished. Miscellaneous users are active in the market, in many instances to cover for fourth quarter. Automobile manufacturers are still ordering lightly, but improved demand is expected after Labor Day. Rolling schedules are at about 90 per cent of capacity. Shipments are easing, and delivery dates have been brought within reasonable distance of requests.

Pig iron demand has improved somewhat. The new furnace of the Hamilton Iron & Coke Co. was blown in last week.

...New England pig iron price still in doubt.

BOSTON, Aug. 24.—The Mystic Iron Works has taken no definite action as to fourth quarter pig iron prices. For the present it will accept fourth quarter business at third quarter prices, but it is not soliciting business. Future price policy will depend to a large extent on the action of the domestic scrap market and the foreign situation. Due to excessive heat and high humidity New England foundries the past week operated not more than four days, or not at all. A majority in Massachusetts opened Tuesday morning and closed Thursday night. Their interest in pig iron purchases was practically nil. A boat with 300 tons of iron for Sweden left here today. Several foreign countries are dickering on tonnages for September and last quarter shipment.

The three largest steel fabricators in Boston, who were in dispute with the CIO, have signed a contract to recognize members of that organization only. They still have open shops.

Warehouses have reduced diamond pattern floor plates, ⅛-in. and heavier, 30c. per 100 lb. No change has been made in prices for lighter than ⅛-in. plates.

United Fuel Gas Co., Charleston, W. Va., recently placed an order for about 96 miles of 18 and 20-in. seamless tubing involving approximately 16,000 tons, with National Tube Co., Pittsburgh. The pipe is for a line to run from near Cedarville, W. Va., to Marjorsville, W. Va., and will be for natural gas transmission.

Buffalo, 100 tons of 8-ft. pipe, for Buffalo sewage disposal plant. McLain Construction Co., Buffalo, low general bidder.

Godfrey L. Cabot, Inc., Union Building, Charleston, W. Va., operating natural gas and carbon black properties, has authorized new welded steel pipe line from point near Sissonville, Kanawha County, W. Va., to Grantsville, Calhoun County, W. Va., about 40 miles, for natural gas transmission. Connection will be made with company compressor station on Little Kanawha River at last noted place. Cost over $450,000. Executive offices of company are at 77 Franklin Street, Boston.

Rochester Gas & Electric Co., Rochester, N. Y., plans extensions in pipe lines for gas transmission in number of districts, totaling about 2700 lin. ft. Also will extend steel pipe lines for central steam supply to industrial plants. Entire project will cost over $100,000.

Lowell Water District, Lowell, Wash., has revised plans for water distribution system in part of Snohomish County, comprising about 30,000 ft. of 6 and 8-in. steel pipe (with alternate bids to be asked on cast iron pipe), 60,000-gal. elevated steel tank and tower, two deep-well pumping plants and other equipment installation. Special election has been called Aug. 26 to approve plans and financing. Parker & Hill, Smith Tower Building, Seattle, are consulting engineers.

Bureau of Reclamation, Denver, Colo., asks bids until Sept. 2 for steel penstock and discharge pipe line for Owyhee Project, near Homedale, Idaho (Specifications 963-D).

E. L. Buckley, Alamo Bank Building, San Antonio, Tex., is at head of project to construct new welded steel pipe line from oil field districts at North Sweden and Seven Sisters, Jim Wells County, to Corpus Christi, Tex., by way of Alice, Tex., for crude oil transmission to proposed bulk terminal plant and oil refinery at last noted place. A connecting steel pipe line will be built between two oil fields noted, as well as another connecting steel pipe line to Premont oil area in same district; steel pipe line gathering systems will be installed. A large booster pumping station will be located at point near Alice, noted, as well as several smaller such stations at points along route. Entire project with terminal facilities at Corpus Christi will cost over $750,000.

United States Engineer Office, Memphis, Tenn., asks bids until Aug. 31 for 15 welded steel dredge pontoons, each 48 ft. long, 18 ft. wide, and 2 ft. 10-in. deep (Circular 20-F).

Metropolitan Utilities District, Eighteenth and Harney Streets, Omaha, Neb., plans extensions in gas pipe lines, including quantity of 4-in., for installation in 49th, Jefferson and other streets.

Alderwood Water Board, Alderwood Water District, Alderwood Manor (Snohomish County), Wash., Bert Gillis, secretary, will take bids soon for about 22,000 lin. ft. of 3 and 4-in. steel pipe for water distribution system. Parker & Hill, Smith Tower Building, Seattle, are consulting engineers.

...U. S. Engineers office awards 6575 tons of bars to Soule Steel Co.

SAN FRANCISCO, Aug. 23—Award of 6575 tons of round and square bars to Soule Steel Co. by the U. S. Engineers office at Los Angeles was announced last week. This letting led an aggregate of 8640 tons of bars awarded during the week. Ceco Steel Products Co. took 500 tons involved in the Vigna Street grade separation at Los Angeles and Tennessee Coal, Iron & Railroad Co. took another 500 tons called for in the Colorado River reclamation project at Austin, Tex. Other bar awards were small.

The market for structural shapes picked up somewhat with awards totaling 1776 tons. Largest of those was a letting of 716 tons to Bethlehem Steel Co. for construction of an addition to the Albany Hotel at Denver. Pacific Iron & Steel Co. took 300 tons for a telephone building in North Hollywood, Cal.

Award is expected within the next two weeks on 1500 tons of reinforcing steel involved in the San Francisco viaduct for the San Francisco-Oakland Bay bridge. Eaton & Smith were awarded the general contract last week. Clinton Construction Co. took the general contract for the Golden Gate Park sewage disposal plant, San Francisco, calling for 390 tons of bars. The steel contract will be let in the near future.

The House Appropriations Committee at Washington has approved appropriations for 43 post office buildings to be constructed in southern California during the 1937-38 fiscal year. Total cost will exceed $5,500,000, according to preliminary estimates.

Plans and specifications have been completed by the U. S. Enginers office at Los Angeles and bids will probably be called about the middle of September for construction of the Hansen retarding basin. The site is to be located across the Big Tujunga Wash; a dike, approximately two miles long, will be constructed. Estimated cost is between $8,000,000 and $9,000,000.

. . . NON-FERROUS . . .

. . . Export copper drops below 14c. level.

o o o

. . . Lead stocks continue to decrease; zinc quiet.

o o o

. . . Tin buying on moderate scale; quotations steady.

NEW YORK, Aug. 24.—The excitement and abnormal activity occasioned by the erratic climb of the London Exchange two weeks ago, have gradually subsided and current sales of the red metal are back to normal. Shipments to company-affiliated fabricators during the week did much to overcome the weakening effect of the low export price, which after climbing close to 15c. two weeks ago, dropped as low as 13.92c. per lb., London, on some sales Monday. Domestic quotations, however, remain unchanged at 14c. per lb., Connecticut Valley for electrolytic grade.

The Week's Prices. Cents Per Pound for Early Delivery

	Aug. 18	Aug. 19	Aug. 20	Aug. 21	Aug. 23	Aug. 24
Electrolytic copper, Conn.*	14.00	14.00	14.00	14.00	14.00	14.00
Lake copper, N. Y.	14.125	14.125	14.125	14.125	14.125	14.125
Straits tin, spot, New York	59.50	59.50	59.50	....	59.375	58.875
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25	7.25
Zinc, New York	7.60	7.60	7.60	7.60	7.60	7.60
Lead, St. Louis	6.35	6.35	6.35	6.35	6.35	6.35
Lead, New York	6.50	6.50	6.50	6.50	6.50	6.50

*Delivered Connecticut Valley; price ¼c. lower delivered in New York.
Aluminum, virgin 99 per cent plus 20.00c.-21.00c. a lb., delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 19.00c. to 19.50c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 15.375c. a lb., prompt, f.o.b., New York.
Quicksilver, $92.00 to $93.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 14.25c. a lb., less carload, delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	60.50c. to 61.50c.
Tin, bar	62.50c. to 63.50c.
Copper, Lake	15.00c. to 16.00c.
Copper, electrolytic	15.00c. to 16.00c.
Copper, castings	14.75c. to 15.75c.
*Copper sheets, hot-rolled	21.75c.
*High brass sheets.	19.75c.
*Seamless brass tubes	22.50c.
*Seamless copper tubes	22.625c.
*Brass rods	16.25c.
Zinc, slabs	8.75c. to 9.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	13.00c.
Lead, American pig.	7.50c. to 8.50c.
Lead, bar	8.50c. to 9.50c.
Lead, sheets, cut	10.00c.
Antimony, Asiatic	16.25c. to 16.75c.
Alum., virgin, 99 per cent plus	22.50c. to 24.00c.
Alum., No. 1 for remelting, 98 to 99 per cent	19.50c. to 21.00c.
Solder, ½ and ½	35.00c. to 36.00c.
Babbitt metal, commercial grade	25.00c. to 65.00c.

*These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 33⅓ per cent allowed off for extras, except copper tubes and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	63.625c.
Tin, bar	65.625c.
Copper, Lake	15.00c. to 15.25c.
Copper, electrolytic	15.00c. to 15.25c.
Copper, castings	14.75c. to 15.00c.
Zinc, slabs	8.75c. to 9.00c.
Lead, American pig.	7.00c. to 7.25c.
Lead, bar	10.50c. to 11.00c.
Antimony, Asiatic	17.88c.
Babbitt metal, medium grade	26.00c.
Babbitt metal, high grade	67.625c.
Solder, ½ and ½	40.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	10.875c.	11.625c.
Copper, hvy. and wire	10.25c.	10.75c.
Copper, light and bottoms	9.25c.	9.50c.
Brass, heavy	6.25c.	6.875c.
Brass, light	5.125c.	5.375c.
Hvy. machine composition	9.125c.	9.625c.
No. 1 yel. brass turnings	7.50c.	8.00c.
No. 1 red brass or compos. turnings	8.875c.	9.375c.
Lead, heavy	4.625c.	5.00c.
Cast aluminum	12.125c.	13.25c.
Sheet aluminum	13.25c.	14.75c.
Zinc	3.50c.	3.875c.

Lead

Buying is quiet and is following the lines established a week ago, after the buying wave of the first half of the month had receded. Shipments continue to be in excess of production. As August requirements are almost completely covered and September over 75 per cent contracted, there will be little incentive for buying until the October books are opened a week hence. Statistics for July showed that production had turned upward, after declining in May and June. The figure for July was 45,496 tons, an increase of 5340 tons over June. Shipments gained a comparable amount and totaled 47,727 tons. Stocks were further reduced and now stand at 111,103 tons, or roughly two months' supply. In July, 1936, stocks amounted to 231,081 tons.

Zinc

Although ore production has increased slightly and several lots of foreign spelter are reported engaged for September delivery, there has been no change in the basic supply position, and probably will not be for some time to come. Consumers seem to have accepted this condition and are taking whatever metal is allotted them without comment. Sales of prime Western for the week totaled 6661 tons. Shipments increased slightly to 5852 tons, and undelivered stocks expanded to 100,864 tons. All metal is offered at the firm price level of 7.60c. per lb., New York.

Ingot Brass and Bronze

Average prices received by members of the Non-Ferrous Ingot Metal Institute during the 28-day period ended Aug. 6, on commercial 80-10-10 and 85 per cent brass ingots, were 15.785c. and 13.771c. per lb. respectively. Deliveries of brass and bronze ingots in July amounted to 7087 tons, as compared with 6584 tons in June. Unfilled orders on Aug. 1 totaled 17,542 tons, as against 15,784 tons on July 1.

Tin

Buying, though in moderate quantities, is steady, with interest veering from nearby to future positions. Quotations have been moving in a limited range and are steadier than they have been for some time. Straits metal in New York is quoted today at 58.875c. per lb. Shipments of Straits tin through Aug. 21 amounted to 6121 tons. Prices in London were soft all week, and the decline inaugurated two weeks ago has continued. Straits metal in London, on first call this morning, was quoted at £260 for prompt delivery, and £259 for future.

IRON AND STEEL SCRAP

AUG. 24.—Quietness rules most markets this week, as mills in general withhold new orders pending establishment of definite trends. Prices are unchanged at Chicago, Philadelphia, Cleveland, Cincinnati, St. Louis and Detroit on the principal grades. Buffalo is the only district showing real strength as a result of a 25,000-ton sale into consumption, advancing the list 50c. on many items, excepting No. 1 steel. At Pittsburgh, No. 1 steel brought $22.50 on a moderate sale, up 50c. from last week, but the edge is off the market there, and brokers have lowered their buying offers. The market is definitely weaker at Youngstown, following a recent large purchase, and No. 1 steel is down 50c. Considerable strength is being shown in materials for export both at Boston and at New York, although no new orders are reported. The composite figure is up 8c. to $20.58 as a result of the 25c. advance in the Pittsburgh average.

Pittsburgh

During the latter part of last week a moderate-sized tonnage of No. 1 heavy melting steel was sold into consumption at $22.50 a ton. At about the same time a tonnage of scrap involving a special grade composed of dismantled tank car material was also sold into consumption at $22.50 a ton. No. 1 steel is quotable this week at $22 to $22.50 a ton, up 25c. from last week's average price. Within the past few days the edge is off the market slightly and some brokers who had been paying $22 a ton to cover are offering $21.50 a ton and obtaining some material. Other dealers are offering $21 a ton with little or no success. With buyers out of the market, a definite trend must probably await the outcome of railroad lists, which close this week. Within the past week a moderate tonnage of railroad heavy melting steel was sold at $23 a ton. Other sales have been made recently at $24 a ton.

Chicago

The scrap market here continued quiet again last week, it now being three weeks since a sale was made to a local mill. The nominal quotation for No. 1 heavy melting steel is unchanged at $19.50 to $20. Brokers in some instances have dropped their bids, but, except for a little distress tonnage, dealers have shown no great disposition to sell, so that the undertone remains strong.

Philadelphia

This market has definitely leveled off pricewise, and there is little expectation of much activity prior to Labor Day. For the time being, mills are amply covered against all requirements, and each purchasing agent is holding new buying in abeyance until a better trend develops in finished steel backlogs. This attitude is giving brokers little or no concern; they point to the high district operating rate and the general expectation of sustained business in the fall as two factors tending to ultimately drive prices to even higher levels. Scattered sales of various railroad grades have established quotations 50c. higher, but important heavy melting grades are for the second week untested. Export activity here is still of no importance.

Cleveland

Lack of further buying after the recent large purchase of steel making scrap by a Youngstown consumer and restrictions placed on shipments by this buyer have given the market a weaker tone and dealers' buying prices have declined 50c. a ton in the Youngstown district where $21.50 now appears to be the maximum dealer's price for No. 1 heavy melting steel. Cleveland steel making scrap, which was not affected by the recent advance, is now going mostly to the Youngstown and Pittsburgh districts. Cast iron borings and mixed borings and turnings are scarce and 50c. a ton higher in Cleveland, this being attributed to an increase in demand from a local consumer which recently started up a blast furnace. Other Cleveland quotations are unchanged.

Buffalo

The leading consumer of the area is reported to have bought 25,000 tons of material in the past few days at prices ranging from $20.50 to $21.50 for the No. 1 heavy melting steel, and $18.50 and $19.50 for the preponderant portion of the purchase, made up of No. 2 heavy melting steel, new hydraulic compressed sheets and No. 1 busheling. The buyer which ordinarily pegs the price it will pay for machine shop turnings at $6 under its No. 1 heavy melting steel price, has placed a stopper of $13 on this grade, and according to present reports will not go above this figure.

Boston

Exporters have raised Nos. 1 and 2 steel 25c. to 50c. a ton, and the market for domestic delivered bundled skeleton is about 50c. higher, but scrap prices otherwise remain as heretofore. Scattered carlot shipments of steel turnings, blast furnace material and bundled skeleton to Pennsylvania continue. Exporters are securing little new business, but are busy with shipments to the United Kingdom and Italy. Japan has held up shipping instructions and about 40,000 tons bought by that country has been resold to Italy. To Hull, England, the past week went 10,150 tons of scrap.

New York

Mixed trends and mixed sentiment prevail in the New York market, a situation largely confused by the competition between foreign and domestic interests. Mills in eastern Pennsylvania appear to be temporarily out of the market and in some instances have held up shipments. Softness has developed in heavy breakable cast, and buying prices are down 50c. On the other hand, clean steel turnings are stronger. In some offices, both bullish and bearish sentiment prevails, and brokers are taking both long and short positions, with the bears predominating. While no new export business has been reported for months, the large amount of material going forward on old orders is maintaining strength. While some brokers are paying no more than $16.50 on barges for No. 1 steel, and $15.50 for No. 2, it is definitely established that such materials have brought 50c. and occasionally $1 above these figures in the past week.

Cincinnati

Upward trend of dealers' bids stopped abruptly the past week, as mills tended to ease ordering. Further softness developed on word of temporary suspension of shipments to one interest at Youngstown. Prices, however, are unchanged, but in the absence of demand, are nominal.

St. Louis

While there has been no buying in quantity by the industries, the heavy purchasing of recent weeks has created a tight situation and the market is very firm at the peak of the recent advance. Very little scrap is coming out from any source, though the higher prices have tended to stimulate the movement from country shipping points. A rather heavy short interest is said to exist among brokers and dealers, and outside inquiries are large. The only railroad offering before the trade was 1200 tons by the Missouri, Kansas and Texas, closed on Aug. 18. Yard stocks are generally light and assortments incomplete. Scrap preparation has been hampered by extreme high temperatures.

Detroit

Scrap production has reached its lowest point of the year in the Detroit area with little expected from any sources before the middle of September. The market is definitely weaker, with blast furnace grades falling off more rapidly than others. Under the circumstances, price quotations undoubtedly should reflect weakness, but it was generally conceded in Detroit that there were no offers and no selling so that prices are nominal. Lists are out for major producers and the end of this week should see enough buying to establish the market.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:			
No. 1 hvy. mltng. steel	$22.00	to	$22.50
Railroad hvy. mltng...	23.00	to	24.00
No. 2 hvy. mltng. steel.	19.50	to	20.00
No. 2 RR. wrought.....	22.00	to	22.50
Scrap rails	24.00	to	24.50
Rails 3 ft. and under..	25.50	to	26.00
Comp. sheet steel	22.00	to	22.50
Hand bundled sheets..	20.00	to	20.50
Hvy. steel axle turn...	20.00	to	20.50
Machine shop turn.....	15.50	to	16.00
Short shov. turn.....	15.50	to	16.00
Mixed bor. & turn....	15.50	to	16.00
Cast iron borings	15.50	to	16.00
Cast iron carwheels....	20.50	to	21.00
Hvy. breakable cast...	17.50	to	18.00
No. 1 cupola cast.....	20.00	to	20.50
RR. knuckles & cplrs..	27.00	to	27.50
Rail coil & leaf springs	27.00	to	27.50
Rolled steel wheels.....	27.00	to	27.50
Low phos. billet crops.	27.00	to	27.50
Low phos. sh. bar.....	26.00	to	26.50
Low phos. punchings..	24.00	to	24.50
Low phos. plate, hvy...	25.50	to	26.00
Low phos. plate clips..	24.00	to	24.50
Steel car axles	27.00	to	27.50

PHILADELPHIA

Per gross ton delivered to consumer:			
No. 1 hvy. mltng. steel	$19.50	to	$20.00
No. 2 hvy. mltng. steel.	17.50	to	18.00
Hydraulic bund., new..	19.00	to	19.50
Hydraulic bund., old...	15.50	to	16.00
Steel rails for rolling..	23.00	to	23.50
Cast iron carwheels...	20.50	to	21.00
Hvy. breakable cast....	19.00	to	19.50
No. 1 cast	21.00	to	21.50
Stove plate (steel wks.)	16.50	to	17.00
Railroad malleable	20.00	to	21.00
Machine shop turn.....	14.00	to	14.50
No. 1 blast furnace ...	13.50	to	14.00
Cast borings	13.50	to	14.00
Heavy axle turnings...	16.00	to	16.50
No. 1 low phos. hvy...	24.50	to	25.00
Couplers & knuckles..	25.50	to	26.00
Rolled steel wheels....	25.50	to	26.00
Steel axles	29.00	to	29.50
Shafting	24.00	to	24.50
No. 1 RR. wrought	20.50	to	21.00
Spec. iron & steel pipe	16.50	to	17.00
No. 1 forge fire	17.00	to	17.50
Cast borings (chem.).	14.50	to	15.00

CHICAGO

Delivered to Chicago district consumers:			
	Per Gross Ton		
Hvy. mltng. steel.....	$19.50	to	$20.00
Auto. hvy. mltng. steel, alloy free	17.50	to	18.00
No. 2 auto. steel	15.50	to	16.00
Shoveling steel	19.50	to	20.00
Hydraul. comp. sheets.	18.50	to	19.00
Drop forge flashings...	16.00	to	16.50
No. 1 busheling	18.50	to	19.00
Rolled carwheels	22.50	to	23.00
Railroad tires, cut	22.50	to	23.00
Railroad leaf springs..	22.00	to	22.50
Steel coup. & knuckles	21.50	to	22.00
Axle turnings	18.00	to	18.50
Coil springs	24.00	to	24.50
Axle turn. (elec.).....	19.00	to	19.50
Low phos. punchings..	22.00	to	22.50
Low phos. plates, 12 in. and under	22.00	to	22.50
Cast iron borings	12.00	to	12.50
Short shov. turnings..	12.50	to	13.00
Machine shop turn. ...	10.50	to	11.00
Rerolling rails	21.50	to	22.00
Steel rails under 3 ft...	22.00	to	22.50
Steel rails under 2 ft...	22.50	to	23.00
Angle bars, steel	22.00	to	22.50
Cast iron carwheels ..	19.50	to	20.00
Railroad malleable	20.50	to	21.00
Agric. malleable	17.50	to	18.00
	Per Net Ton		
Iron car axles	$26.00	to	$26.50
Steel car axles	23.50	to	24.00
No. 1 RR. wrought ...	17.25	to	17.75
No. 2 RR. wrought ...	17.25	to	17.75
No. 2 busheling, old..	9.50	to	10.00
Locomotive tires	19.00	to	19.50
Pipes and flues	14.00	to	14.50
No. 1 machinery cast...	16.50	to	17.00
Clean auto. cast.....	15.50	to	16.00
No. 1 railroad cast.....	15.50	to	16.00
No. 1 agric. cast.....	14.00	to	14.50
Stove plate	12.00	to	12.50
Grate bars	13.50	to	14.00
Brake shoes	13.00	to	13.50

YOUNGSTOWN

Per gross ton delivered to consumer:			
No. 1 hvy. mltng. steel.	$21.00	to	$21.50
Hydraulic bundles	20.00	to	20.50
Machine shop turn. ...	15.50	to	16.00

CLEVELAND

Per gross ton delivered to consumer:			
No. 1 hvy. mltng. steel.	$20.00	to	$20.50
No. 2 hvy. mltng. steel.	19.00	to	19.50
Comp. sheet steel	19.50	to	20.00
Light bund. stampings.	16.00	to	16.50
Drop forge flashings...	18.50	to	19.00
Machine shop turn.....	13.00	to	13.50
Short shov. turn.....	13.00	to	13.50
No. 1 busheling	19.00	to	19.50
Steel axle turnings....	15.50	to	16.00
Low phos. billet and bloom crops	25.50	to	26.00
Cast iron borings	14.50	to	15.00
Mixed bor. & turn....	14.50	to	15.00
No. 2 busheling	13.50	to	14.00
No. 1 cast.....	19.00	to	19.50
Railroad grate bars...	11.50	to	12.00
Stove plate	11.00	to	11.50
Rails under 3 ft.	24.00	to	24.50
Rails for rollings	21.00	to	21.50
Railroad malleable	22.00	to	22.50
Cast iron carwheels....	....		21.50

BUFFALO

Per gross ton, f.o.b. consumers' plants:			
No. 1 hvy. mltng. steel.	$21.00	to	$21.50
No. 2 hvy. mltng. steel.	18.50	to	19.50
Scrap rails	21.00	to	21.50
New hvy. b'ndled sheet	18.50	to	19.50
Old hydraul. bundles...	17.50	to	18.50
Drop forge flashings ..	18.50	to	19.50
No. 1 busheling	18.50	to	19.50
Hvy. axle turnings ...	16.00	to	16.50
Machine shop turn.....	12.50	to	13.00
Knuckles & couplers..	23.00	to	23.50
Coil & leaf springs....	23.00	to	23.50
Rolled steel wheels.....	23.00	to	23.50
Low phos. billet crops.	23.00	to	23.50
Shov. turnings	14.50	to	15.00
Mixed bor. & turn.	13.00	to	13.50
Cast iron borings	13.00	to	13.50
Steel car axles	21.00	to	22.00
No. 1 machinery cast..	19.50	to	20.00
No. 1 cupola cast.....	18.00	to	18.50
Stove plate	16.00	to	16.50
Steel rails under 3 ft...	24.00	to	25.00
Cast iron carwheels...	18.00	to	18.50
Railroad malleable	21.50	to	22.00
Chemical borings	14.00	to	14.50

ST. LOUIS

Dealer's buying prices per gross ton delivered to consumer:			
Selected hvy. metal....	$17.25	to	$17.50
No. 1 hvy. melting.....	16.75	to	17.25
No. 2 hvy. melting....	15.50	to	16.00
No. 1 locomotive tires.	19.00	to	19.50
Misc. stand.-sec. rails.	18.00	to	18.50
Railroad springs	21.00	to	21.50
Bundled sheets	14.00	to	14.50
No. 2 RR. wrought ..	16.75	to	17.25
No. 1 busheling	12.00	to	12.50
Cast bor. & turn.	8.50	to	9.00
Rails for rolling	19.50	to	20.00
Machine shop turn....	9.00	to	9.50
Heavy turnings	13.50	to	14.00
Steel car axles	23.00	to	23.50
Iron car axles	24.00	to	24.50
No. 1 RR. wrought	15.00	to	15.50
Steel rails under 3 ft..	20.00	to	20.50
Steel angle bars	19.00	to	19.50
Cast iron carwheels...	18.00	to	18.50
No. 1 machinery cast...	14.00	to	14.50
Railroad malleable	19.50	to	20.00
No. 1 railroad cast.....	14.00	to	14.50
Stove plate	12.50	to	13.00
Agricul. malleable	12.50	to	13.00
Grate bars	12.00	to	12.50
Brake shoes	12.00	to	12.50

CINCINNATI

Dealers' buying prices per gross ton:			
No. 1 hvy. mltng. steel.	$18.50	to	$19.00
No. 2 hvy. mltng. steel.	15.50	to	16.00
Scrap rails for mltng..	21.00	to	21.50
Loose sheet clippings..	14.00	to	14.50
Hydrau. b'nd'ed sheets	17.00	to	17.50
Cast iron borings.....	11.00	to	11.50
Machine shop turn. ...	11.50	to	12.00
No. 1 busheling	15.50	to	16.00
No. 2 busheling	9.00	to	9.50
Rails for rolling.....	23.00	to	23.50
No. 1 locomotive tires..	19.50	to	20.00
Short rails	24.00	to	24.50
Cast iron carwheels....	17.50	to	18.00
No. 1 machinery cast..	16.50	to	17.00
No. 1 railroad cast.....	16.00	to	16.50
Burnt cast	11.50	to	12.00
Stove plate	11.50	to	12.00
Agricult. malleable	18.00	to	18.50
Railroad malleable ...	20.00	to	20.50
Mixed hvy. cast.	14.00	to	14.50

BIRMINGHAM

Per gross ton delivered to consumer:			
Hvy. melting steel	$16.00	to	$16.50
Scrap steel rails	....		17.00
Short shov. turnings..	9.00	to	10.00
Stove plate	....		10.00
Steel axles	18.00	to	19.00
Iron axles	16.50	to	18.00
No. 1 RR. wrought....	13.00	to	15.00
Rails for rolling	18.00	to	20.00
No. 1 cast	16.00	to	18.00
Tramcar wheels	16.00	to	18.00

DETROIT

Dealers' buying prices per gross ton:			
No. 1 hvy. mltng. steel.	$17.50	to	$18.00
No. 2 hvy. mltng. steel.	16.50	to	17.00
Borings and turnings.	13.25	to	13.75
Long turnings	12.50	to	13.00
Short shov. turnings..	14.00	to	14.50
No. 1 machinery cast...	16.00	to	16.50
Automotive cast.	16.75	to	17.25
Hydraul. comp. sheets.	18.50	to	19.00
Stove plate	10.50	to	11.00
New factory bushel....	17.00	to	17.50
Old No. 2 busheling....	11.50	to	12.00
No. 2 busheling (black fender stock)	14.25	to	14.75
Sheet clippings	13.50	to	14.00
Flashings	16.25	to	16.75
Low phos. plate scrap.	18.50	to	19.00

NEW YORK

Dealers' buying prices per gross ton:			
No. 1 hvy. mltng. steel.	$16.00	to	$17.00
No. 2 hvy. mltng. steel.	14.50	to	15.50
Hvy. breakable cast...	15.00	to	15.50
No. 1 machinery cast...	15.50	to	16.00
No. 2 cast.	14.50	to	15.00
Stove plate	12.00	to	12.50
Steel car axles	27.00	to	27.50
Shafting	19.50	to	20.00
No. 1 RR. wrought....	17.50	to	18.00
No. 1 wrought long...	16.50	to	17.00
Spec. iron & steel pipe.	13.00	to	13.50
Rails for rolling	19.00	to	19.50
Clean steel turnings ..	10.00	to	10.50
Cast borings	9.00	to	9.50
No. 1 blast furnace	9.00	to	9.50
Cast borings (chem.)..	12.50	to	13.00
Unprepar. yard scrap..	11.00	to	12.00
Per gross ton, delivered local foundries			
No. 1 machn. cast.....	$17.50	to	$18.50
No. 1 hvy. cast cupola.	14.50	to	15.00
No. 2 cast	14.00	to	14.50

BOSTON

Dealers' buying prices per gross ton:			
No. 1 hvy. mltng. steel.	$15.30	to	$16.30
Scrap rails	16.00	to	16.50
No. 2 steel	14.30	to	15.30
Breakable cast	15.00	to	15.10
Machine shop turn.....	9.30	to	10.00
Mixed bor. & turn.....	9.30	to	10.50
Bund. skeleton long...	13.25	to	13.30
Shafting	19.00	to	19.50
Cast bor. chemical....	9.00	to	10.00
Per gross ton delivered consumers' yards:			
Textile cast.	$18.00	to	$19.00
No. 1 machine cast....	18.00	to	19.00

CANADA

Dealers' buying prices at their yards, per gross ton		
	Toronto	Montreal
No. 1 hvy. mltng. stl...	$12.50	$12.00
No. 2 hvy. mltng. stl...	11.50	11.00
Mixed dealers steel....	11.00	10.50
Scrap pipe	10.00	9.75
Steel turnings	8.00	8.00
Cast borings	9.25	9.00
Machinery cast.	16.00	15.50
Dealers cast.	14.00	14.00
Stove plate	12.00	11.00

EXPORT

Dealers' buying prices per gross ton:			
New York, truck lots, delivered, barges.			
No. 1 hvy. mltng. steel.	$16.50	to	$17.00
No. 2 hvy. mltng. steel.	15.50	to	16.00
No. 2 cast.	14.50	to	15.00
Stove plate	12.50	to	13.00
Boston on cars at Army Base or Mystic Wharf			
No. 1 hvy. mltng. steel.	$18.25	to	$18.50
No. 2 hvy. mltng. steel.	17.25	to	17.50
Rails (scrap)	....		18.00
Philadelphia, delivered alongside boats, Port Richmond			

No market at present.

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Ton
Rerolling	$37.00
Forging quality	43.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$37.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	2.10c.

Wire Rods
(No. 5 to 9/32 in.)

	Per Gross Ton
F.o.b. Pittsburgh or Cleveland	$47.00
F.o.b. Chicago, Youngstown or Anderson, Ind	48.00
F.o.b. Worcester, Mass.	49.00
F.o.b. Birmingham	50.00
F.o.b. San Francisco	56.00
F.o.b. Galveston	53.00

Rods over 9/32 in. to 47/64 in., inclusive, $5 a ton over base.

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh	2.45c.
F.o.b. Chicago or Gary	2.50c.
F.o.b. Duluth	2.60c.
Del'd Detroit	2.60c.
F.o.b. Cleveland	2.50c.
F.o.b. Buffalo	2.55c.
Del'd Philadelphia	2.74c.
Del'd New York	2.78c.
F.o.b. Birmingham	2.60c.
F.o.b. cars dock Gulf ports	2.85c.
F.o.b. cars Pacific Ports	3.00c.

Rail Steel
(For merchant trade)

F.o.b. Pittsburgh	2.30c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill.	2.35c.
F.o.b. Buffalo	2.40c.
F.o.b. Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.70c.
F.o.b. cars dock Pacific ports	2.85c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.55c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.60c.
Del'd Detroit	2.70c.
F.o.b. cars dock Gulf ports	2.95c.
F.o.b. cars dock Pacific ports	2.95c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.40c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.80c.
F.o.b. cars dock Pacific ports	2.80c.

Iron

F.o.b. Chicago	2.40c.
F.o.b. Pittsburgh (refined)	3.60c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.90c.
F.o.b. Cleveland, Chicago and Gary	2.95c.
F.o.b. Buffalo	3.00c.
F.o.b. Detroit	2.95c.

* In quantities of 10,000 to 19,999 lb.

Plates

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago or Gary	2.30c.
Del'd Cleveland	2.435c.
F.o.b. Coatesville or Spar. Pt.	2.35c.
Del'd Philadelphia	2.425c.
Del'd New York	2.53c.
F.o.b. Birmingham	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.
Wrought iron plates, f.o.b. Pittsburgh	3.80c.

Floor Plates

	Base per Lb.
F.o.b. Pittsburgh	3.50c.
F.o.b. Chicago	3.55c.
F.o.b. Coatesville	3.60c.
F.o.b. cars dock Gulf ports	3.90c.
F.o.b. cars dock Pacific ports	4.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago	2.30c.
Del'd Cleveland	2.435c.
F.o.b. Buffalo or Bethlehem	2.35c.
Del'd Philadelphia	2.455c.
Del'd New York	2.5025c.
F.o.b. Birmingham (standard)	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Chicago or Buffalo	2.70c.
F.o.b. cars dock Gulf or Pacific Coast ports	3.05c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$42.50
Angle bars, per 100 lb.	2.80

F.o.b. Basing Points

Light rails (from billets) per gross ton	$43.00
Light rails (from rail steel) per gross ton	42.00

	Base per Lb.
Spikes	3.15c.
Tie plates, steel	2.30c.
Tie plates, Pacific Coast ports	2.40c.
Track bolts, to steam railroads	4.35c.
Track bolts, to jobbers, all sizes (per 100 counts)	65-5 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	2.40c.
No. 10, f.o.b. Gary	2.50c.
No. 10, del'd Detroit	2.60c.
No. 10, del'd Philadelphia	2.69c.
No. 10, f.o.b. Granite City	2.60c.
No. 10, f.o.b. Birmingham	2.55c.
No. 10, f.o.b. cars dock Pacific ports	2.95c.
No. 10 wrought iron, Pgh.	4.25c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	3.15c.
No. 24, f.o.b. Gary	3.25c.
No. 24, del'd Detroit	3.35c.
No. 24, del'd Philadelphia	3.44c.
No. 24, f.o.b. Granite City	3.35c.
No. 24, f.o.b. Birmingham	3.30c.
No. 24, f.o.b. cars dock Pacific ports	3.80c.
No. 24, wrought iron, Pittsburgh	5.15c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	3.10c.
No. 10 gage, f.o.b. Gary	3.20c.
No. 10 gage, f.o.b. Detroit	3.30c.
No. 10 gage, del'd Philadelphia	3.39c.
No. 10, f.o.b. Granite City	3.30c.
No. 10 gage, f.o.b. Birmingham	3.25c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.70c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	3.55c.
No. 20 gage, f.o.b. Gary	3.65c.
No. 20 gage, del'd Detroit	3.75c.
No. 20 gage, del'd Philadelphia	3.84c.
No. 20, f.o.b. Granite City	3.75c.
No. 20 gage, f.o.b. Birmingham	3.70c.
No. 20 gage, f.o.b. cars, dock, Pacific ports	4.10c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.80c.
No. 24, f.o.b. Gary	3.90c.
No. 24, del'd Philadelphia	4.09c.
No. 24, f.o.b. Granite City	4.00c.
No. 24, f.o.b. Birmingham	3.95c.
No. 24, f.o.b. cars, dock, Pacific ports	4.40c.
No. 24, wrought iron, Pittsburgh	6.10c.

Electrical Sheets
(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.35c.
Armature	3.70c.
Electrical	4.20c.
Special Motor	5.10c.
Special Dynamo	5.80c.
Transformer	6.30c.
Transformer Special	7.30c.
Transformer Extra Special	7.80c.

Base gage changed from 28 to 24 gage. Gage extras are the same as those applying on hot-rolled, annealed sheets with few exceptions.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	4.10c.
F.o.b. Gary	4.20c.
F.o.b. cars, dock, Pacific ports	4.80c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.50c.
No. 20, f.o.b. Gary	3.60c.
No. 20, f.o.b. Granite City	3.70c.
No. 20, f.o.b. cars dock Pacific ports	4.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh, per lb.	3.30c.
No. 28, Gary	3.40c.
No. 28, f.o.b. Granite City	3.50c.
No. 28, cars dock Pacific ports, boxed	4.175c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. Pittsburgh district mill	$5.35
Standard cokes, f.o.b. Gary	5.45
Standard coke, f.o.b. Granite City	5.55

Above quotations practically the equivalent of previous quotations owing to new method of quoting, effective Jan. 1, 1937.

Special Coated Manufacturing Ternes

	Base per Box
F.o.b. Pittsburgh	*$4.65
F.o.b. Gary	* 4.75
F.o.b. Granite City	4.85

* Customary 7½ per cent discount in effect through 1936 discontinued as of Jan. 1, 1937.

Roofing Terne Plate
(F.o.b. Pittsburgh)

(Per Package, 112 sheets, 20 x 28 in.)	
8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Hot-Holled Hoops, Bands, Strip and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	2.40c.
All widths up to 24 in., Chicago	2.50c.
All widths up to 24 in., del'd Detroit	2.60c.
All widths up to 24 in., Granite City	2.60c.
All widths up to 24 in., Birmingham	2.55c.
Cooperage stock, Pittsburgh	2.50c.
Cooperage stock, Chicago	2.60c.

Cold-Rolled Strip*

	Base per Lb.
F.o.b. Pittsburgh	3.20c.
F.o.b. Cleveland	3.20c.
Del'd Chicago	3.48c.
F.o.b. Worcester	3.40c.

* Carbon 0.25 and less.

Cold Rolled Spring Steel

		Pittsburgh and Cleveland	Worcester
Carbon	0.25-0.50%	3.20c.	3.40c.
Carbon	.51- .75	4.45c.	4.65c.
Carbon	.76-1.00	6.30c.	6.50c.
Carbon	Over 1.00	8.50c.	8.70c.

Fender Stock

No. 14, Pittsb'gh or Cleveland	3.45c.
No. 20, Pittsb'gh or Cleveland	3.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

	Per Lb.
Bright wire	2.90c.
Galvanized wire	2.95c.
Spring wire	3.50c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.75
Smooth coated nails	$2.75
Cut nails, carloads	$3.60

	Base per 100 Lb.
Annealed fence wire	$3.20
Galvanized fence wire	3.60
Polished staples	3.45
Galvanized staples	3.70
Barbed wire, galvanized	3.40
Twisted barbless wire	3.40
Woven wire fence, base column	.74
Single loop bale ties, base col.	.63

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $2 a ton over Pittsburgh, except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld			*Butt Weld*	
Steel			*Wrought Iron*	
In.	Black	Galv.	In.	Black Galv.
⅛	52	31	⅛ & ¼	+13 +35
⅛ to ⅜	55	38½	½	20 1½
½	59½	49	¾	26 8
¾	62½	53	1 & 1¼	30 14
1 to 3	64½	55½	1½	34 16½
			2	33½ 16

Lap Weld			*Lap Weld*	
2	57	47½	2	26½ 10
2½ & 3	60	50½	2½ to 3½	27½ 12½
3½ to 6	62	52½	4	29½ 16
7 & 8	61	50½	4½ to 8	28½ 15
9 & 10	60½	50	9 to 12	24½ 10
11 & 12	59½	49		

Butt Weld, extra strong, plain ends			*Butt Weld, extra strong, plain ends*	
⅛	50½	36½	¼ & ⅜	+14 +48
¼ to ⅜	52½	40½	½	21 4
½	57½	48½	¾	27 10
¾	61½	52½	1 to 2	34 17½
1 to 3	63	55		

Lap Weld, extra strong, plain ends			*Lap Weld, extra strong, plain ends*	
2	55	46½	2	29½ 13½
2½ & 3	59	50½	2½ to 4	35 20½
3½ to 6	62½	54	4½ to 6	33½ 19
7 & 8	61½	51	7 & 8	34½ 19½
9 & 10	60½	50	9 to 12	28 15½
11 & 12	59½	49		

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 9.46	$ 8.41
1¼ in. o.d.	13 B.W.G.	11.21	9.96
1½ in. o.d.	13 B.W.G.	12.38	11.00
1⅝ in. o.d.	13 B.W.G.	14.09	12.51
2 in. o.d.	13 B.W.G.	15.78	14.02
2¼ in. o.d.	13 B.W.G.	17.60	15.63
2½ in. o.d.	12 B.W.G.	19.37	17.21
2¾ in. o.d.	12 B.W.G.	21.22	18.85
2⅞ in. o.d.	12 B.W.G.	22.49	19.98
3 in. o.d.	12 B.W.G.	23.60	20.97
4½ in. o.d.	10 B.W.G.	45.19	40.15
3½ in. o.d.	11 B.W.G.	29.79	26.47
4 in. o.d.	10 B.W.G.	36.96	32.83
5 in. o.d.	9 B.W.G.	56.71	50.38
6 in. o.d.	7 B.W.G.	87.07	77.35

Extra for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.	5 %
12,000 lb. or ft. to 24,999 lb. or ft.	12½ %
6,000 lb. or ft. to 11,999 lb. or ft.	25 %
2,000 lb. or ft. to 5,999 lb. or ft.	35 %
Under 2,000 lb. or ft.	50 %

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago	$55.00
6-in. and larger, del'd New York	53.00
*6-in. and larger, Birmingham	47.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	56.00
F.o.b. dock, Seattle	56.00
4-in., f.o.b. dock, San Francisco or Los Angeles	59.00
F.o.b. dock, Seattle	59.00

Class "A" and gas pipe, $3 extra.
4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $46, Birmingham, and $54 delivered Chicago; and 4-in. pipe, $49, Birmingham, and $58 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
⅛ in. x 6 in. and smaller	65 and 5*
Larger and longer up to 1 in.	60 and 10*
1⅛ in. and larger	60 and 5*
Lag bolts	60 and 10*
Plow bolts, Nos. 1, 2, 3 and 7	65 and 5
Hot pressed nuts, and c.p.c. and t nuts, square or hex. blank or tapped:	
⅛ in. and smaller	65
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60

Jobbers discount on above items, 5 per cent.

* Less carload lots and less than full container quality. Less carload lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-finished hexagon nuts, U.S.S. and S.A.E.:	
⅛ in. and smaller	60 and 10
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60
Stove bolts in packages, nuts attached	72½
Stove bolts in packages, with nuts separate	72½ and 5
Stove bolts in bulk	80

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets
(½-in. and larger)

Base per 100 Lbs.

F.o.b. Pittsburgh or Cleveland $3.60
F.o.b. Chicago or Birmingham 3.70

Small Rivets
(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	65 and 5
F.o.b. Cleveland	65 and 5
F.o.b. Chicago and Birmingham	65 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller	60
Upset set screws, cup and oval points	75
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $60 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	3.00c.
Delivered, Detroit	3.15c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
200 (1¼% Nickel)	$0.35
2100 (1½% Nickel)	0.75
2300 (3½% Nickel)	1.55
2500 (5% Nickel)	2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.35
3300 Nickel-chromium	2.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel-molybdenum (0.20 to 0.30 Mo, 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.35
Chromium-nickel-vanadium	1.50
Carbon-vanadium	0.35

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 3½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.60c. base per lb. Delivered Detroit, 3.75c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

	Chrome-Nickel	
	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

	Straight Chrome			
	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	42c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c a lb. higher.

British and Continental

BRITISH

Per Gross Ton f.o.b. United Kingdom Ports

Ferromanganese, export	£20 Nominal
Tin plate, per base box	25s. to 25s. 6d.
Steel bars, open-hearth	£11
Beams, open-hearth	£11 2s. 6d.
Channels, open-hearth	£11 7s. 6d.
Angles, open-hearth	£11 2s. 6d.
Black sheets, No. 24 gage	£15
Galvanized sheets, No. 24 gage	£18 15s.

CONTINENTAL

Per Gross Ton, Gold f.o.b. Continental Ports

Billets, Thomas	£4 7s. 6d.
Wire rods, No. 5 B.W.G.	£6 15s.
Steel bars, merchant	£6 to 6 £ 5s.
Sheet bars	£4 8s. 6d.
Plate ¼ in. and up	£6 17s. 6d. to £7
Plate 3/16 in. and 5 mm.	£7 2s. 6d.
Sheet, ⅛ in.	£8 9s. 6d.
Beams, Thomas	£5 2s. 6d.
Angles (Basic)	£6 2s. 6d.
Hoops and strip, base	£7 to £7 5s.

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Per Net Ton
Plates	3.70c.
Structural shapes	3.70c.
Soft-steel bars and small shapes	3.80c.
Reinforcing steel bars	3.80c.
Cold-finished and screw stock:	
Rounds and hexagons	4.15c.
Squares and flats	4.15c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	4.00c.
Hoops	4.50c.
Hot-rolled annealed sheets (No. 24), 10 or more bundles	4.50c.
Galv. sheets (No. 24), 10 or more bund'es	5.15c.
Hot-rolled sheets (No. 10)	3.75c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$4.48
Spikes, large .....1 to 24 kegs	3.90c.
	Per Cent Off List
Track bolts, all sizes per 100 count	55
Machine bolts, 100 count	**
Carriage bolts, 100 count	**
Nuts, all styles, 100 count	**
Large rivets, base per 100 lb.	$4.35
Wire, black, soft ann'l'd, base per 100 lb.	3.45c.
Wire, galv. soft, base per 100 lb.	3.85c.
Common wire nails, per keg	3.00c.
Cement coated nails, per keg	3.00c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

* Delivered in Pittsburgh switching district.

** Prices on application.

CHICAGO *Base per Lb.*

Plates and structural shapes	3.75c.
Soft steel bars, rounds	3.85c.
Soft steel bars, squares and hexagons	4.00c.
Cold-fin. steel bars:	
Rounds and hexagons	4.30c.
Flats and squares	4.30c.
Hot-rolled strip	4.10c.
Hot-rolled annealed sheets (No. 24)	4.60c.
Galv. sheets (No. 24)	5.25c.
Spikes (keg lots)	4.40c.
Track bolts (keg lots)	5.60c.
Rivets, structural (keg lots)	4.60c.
Rivets, boiler (keg lots)	4.70c.
	Per Cent Off List
Machine bolts	*60
Carriage bolts	*60
Lag screws	*55 and 5
Hot-pressed nuts, sq. tap or blank	*60
Hot-pressed nuts, hex. tap or blank	*60
Hex. head cap screws	60
Cut point set screws	75
Flat head bright wood screws	62 and 20
Spring cotters	45
Stove bolts in full packages	72½
Rd. hd. tank rivets, 7/16 in. and smaller	55
Wrought washers	$4.00 off list
Black ann'l'd wire per 100 lb. to mfg. trade (No. 14 and heavier)	$4.55
Com. wire nails, 15 kegs or more, per keg	$3.20
Cement c't'd nails, 15 kegs or more, per keg	$3.20

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

* These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 60 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

NEW YORK

Base per Lb.

Plates, ¼ in. and heavier	4.00c.
Structural shapes	3.97c.
Soft steel bars, round	4.12c.
Iron bars, Swed. charcoal	7.00 to 7.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.57c.
Flats and squares	4.57c.
Cold-rolled; strip, soft and quarter hard	3.92c.
Hoops	4.32c.
Bands	4.32c.
Hot-rolled sheets (No. 10)	4.00 to 4.07c.
Hot-rolled ann'l'd sheets (No. 24*)	4.50 to 4.32c.
Galvanized sheets (No. 24*)	5.47c.
Long terne sheets (No. 24)	5.50 to 6.20c.
Armco iron, galv. (No. 24†)	6.25c.
Toncan iron, galv. (No. 24†)	6.25c.
Galvanneal (No. 24†)	6.60c.
Armco iron, hot-rolled annealed (No. 24†)	5.65c.
Toncan iron, hot-rolled annealed (No. 24†)	5.65c.
Armco iron hot-rolled (No. 10†)	4.60c.
Toncan iron, hot-rolled (No. 10†)	4.60c.
Cold-rolled sheets (No. 20) for quantities 400 to 1499 lb.	
Standard quality	5.40c.
Deep drawing	6.05c.
Stretcher leveled	6.05c.
SAE, 2300, hot-rolled	7.82c.
SAE, 3100, hot-rolled	6.37c.
SAE, 6100, hot-rolled, annealed	10.52c.
SAE, 2300, cold-rolled	9.00c.
SAE, 3100, cold-rolled, annealed	8.35c.
Floor plate, ⅛ in. and heavier	5.90c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.25c.
Wire, galv. (No. 9)	4.60c.
Tire steel, 1 x ½ in. and larger	4.61c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, base per keg	3.25c.
	Per Cent Off List
Machine bolts, square head and nut: All diameters. Prices on application	
Carriage bolts, cut thread: All diameters. Prices on application	

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

† 125 lb. and more.

ST. LOUIS

Base per Lb.

Plates and struc. shapes	3.99c.
Bars, soft steel (rounds and flats)	4.09c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	4.24c.
Cold-fin. rounds, shafting, screw stock	4.54c.
Hot-rolled annealed sheets (No. 24)	4.84c.
Galv. sheets (No. 24*)	5.49c.
Hot-rolled sheets (No. 10)	4.09c.
Black corrug. sheets (No. 24*)	4.89c.
2 galv. corrug. sheets	5.54c.
Structural rivets	4.94c.
Boiler rivets	5.04c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nts; all quantities	65

* No. 26 and lighter take special prices.

PHILADELPHIA

Base per Lb.

*Plates, ¼-in. and heavier	3.80c.
*Structural shapes	3.80c.
*Soft steel bars, small shapes, iron bars (except bands)	3.90c.
‡Reinforc. steel bars, sq. twisted and deformed	3.43c.
Cold-finished steel bars	4.53c.
*Steel hoops	4.25c.
*Steel bands, No. 12 and 3/16 in. incl.	4.00c.
Spring steel	5.40c.
†Hot-rolled anneal. sheets (No. 24)	4.65c.
†Galvanized sheets (No. 24)	5.30c.
*Hot-rolled annealed sheets (No. 10)	3.90c.
Diam. pat. floor plates, ¼ in.	5.45c.

These prices are subject to quantity differential except on reinforcing and Swedish iron bars.

* Base prices subject to deduction on orders aggregating 4000 lb. or over.

† For 25 bundles or over.

‡ For less than 2000 lb.

CLEVELAND

Base per Lb.

Plates and struc. shapes	3.86c.
Soft steel bars	3.75c.
†Reinforc. steel bars	2.60c.
‡Cold-finished steel bars	4.30c.
Hot-rolled strip, 6 in. wide and under	4.16c.
Cold-finished strip	3.60c.
Hot-rolled annealed sheets (No. 24)	4.66c.
Galvanized sheets (No. 24)	5.31c.
Hot-rolled sheets (No. 10)	3.91c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.91c.
Floor plates, 3/16 in. and heavier	5.76c.
*Black ann'l'd wire, per 100 lb.	$3.40
*No. 9 galv. wire, per 100 lb.	3.80
*Com. wire nails, base per keg	2.95
	Per Cent Off List
Machine and carriage bolts, small	65 and 5
Large	60 and 10
Nuts, 100 count	
½ in. and smaller	65 and 5
9/16 in. to 1 in.	60 and 10

† Outside delivery 10c. less.

* For 5000 lb. or less.

‡ Plus switching and cartage charges and quantity differentials up to 50c.

CINCINNATI

Base per Lb.

Plates and struc. shapes	3.95c.
Floor plates	5.55c.
Bars, rounds, flats and angles	4.05c.
Other shapes	4.20c.
Rail steel reinforc. bars	3.75c.
Hoops and bands, 3/16 in. and lighter	4.25c.
Cold-finished bars	4.50c.
Hot-rolled annealed sheets (No. 24) 3500 lb. or more	4.60c.
Galv. sheets (No. 24) 3500 lb. or more	$5.25
Hot-rolled sheets (No. 10)	4.00c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$3.48
Com. wire nails, base per keg:	
Any quantity less than carload.	3.20
Cement c't'd nails, base 100-lb. keg	3.50
Chain, lin. per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$21.80
4-in.	52.45
Lap-welded steel boiler tubes, 2-in.	20.73
4-in.	48.41

BUFFALO *Base per Lb.*

Plates	3.92c.
Struc. shapes	3.80c.
Soft steel bars	3.90c.
Reinforcing bars	3.10c.
Cold-fin. flats and sq.	4.35c.
Rounds and hex.	4.35c.
Cold-rolled strip steel	3.79c.
Hot-rolled annealed sheets (No. 24)	4.80c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.97c.
Galv. sheet (No. 24)	5.45c.
Bands	4.22c.
Hoops	4.22c.
Heavy hot-rolled sheets	3.97c.
Com. wire nails, base per keg	$3.26
Black wire, base per 100 lb. (2500-lb. lots or under)	4.55c.
(Over 2500 lb.)	4.45c.

BOSTON

Base per Lb.

Channels, angles	4.20c.
Tees and zees, under 3"	4.45c.
H beams and shapes	4.07c.
Plates — Sheared, tank and univ. mill, ¼ thick and heavier	4.08c.
Floor plates, diamond pattern.	5.13c.
Bar and bar shapes (mild steel)	4.20c.
Bands 3/16 in. thick and No. 12 ga. incl.	4.40 to 5.40
Half rounds, half ovals, ovals and bevels	5.45c.
Tire steel	5.45c.
Cold-rolled strip steel	3.845c.
Cold-finished rounds, squares and hexagons	4.65c.
Cold-finished flats	4.65c.
Blue annealed sheets, No. 10 ga.	3.90c.
One pass cold-rolled sheets No. 24 ga.	4.50c.
Galvanized steel sheets, No. 24 ga.	5.05c.
Lead coated sheets, No. 24 ga.	6.15c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.94c.
Structural shapes	3.95c.
Plates	3.95c.
Floor plates	5.35c.
Hot-rolled annealed sheets (No. 24)*	4.69c.
Hot-rolled sheets (No. 10)	3.94c.
Galvanized sheets (No. 24)*	5.40c.
Bands and hoops	4.19c.
Cold-finished bars	4.30c.
Cold-rolled strip	3.75c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	6.44c.

Quantity differential on bars, plates, structural shapes, bands, hoops, floor plates and heavy hot-rolled: Under 100 lb., 1.50c. over base; 100 to 399 lb., base plus .50c.; 400 to 3999 lb. base; 4000 to 9999 lb., base less .10c.; 10,000 lb. and over, less 15c.

* Under 400 lb., .50c. over base; 400 to 1499 lb., base; 1500 to 3499 lb., base less .10c.; 3500 lb. and over, base less .15c.

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.86c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.96c.
Soft steel bars, squares and hexagons	4.11c.
Hot-rolled strip	4.21c.
Hot-rolled annealed sheets (No. 24)	4.71c.
Galvanized sheets (No. 24)	5.36c.
Cold-finished steel bars	4.41c.
Structural rivets (keg lots)	5.16c.
Boiler rivets, cone head (keg lots)	5.26c.
Track spikes (keg lots)	4.61c.
Track bolts (keg lots)	5.81c.
Black annealed wire (No. 6 to No. 9 incl.)	4.05c.
Com. wire nails and cement coated nails 1 to 14 kegs	3.25c.

	Per Cent Off List
Machine bolts and carriage bolts, ½x6 and smaller or shorter	65
Larger and longer up to 1 in., diam.	60-5
1⅛ in. and larger	60
Coach and lag screws	60-5
Hot-pressed nuts, sq. and hex. tapped or blank, 1-199 lb.	50
200 lb. and over:	
½ in. and smaller	65
9/16 to 1 in.	60- 5
1⅛ in. and over	50-10-5

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.55c.
Hot-rolled annealed sheets, No. 24	4.35c.
Galvanized sheets, No. 24	5.50c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BALTIMORE

	Base per Lb.
Mild steel bars and small shapes	4.00c.
Structural shapes	3.90c.
Reinforcing bars, 5 to 15 tons	3.16c.
Plates	3.90c.
Hot-rolled sheets, No. 10	3.95c.
Bands	4.20c.
Hoops	4.45c.
Special threading steel	4.15c.
Checkered floor plates ¼ in. and heavier	5.80c.
Galvanized sheets, No. 24, 100 bdls. or more	$4.70
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	$4.50

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets the base applies on orders 400 to 3999 lb.

All prices are f.o.b. consumers' plants.

For second zone add 10c. per 100 lb. for trucking.

CHATTANOOGA

	Base per Lb.
Mild steel bars	4.21c.
Iron bars	4.21c.
Reinforcing bars	4.21c.
Structural shapes	4.11c.
Plates	4.11c.
Hot-rolled sheets No. 10	4.16c.
Hot-rolled annealed sheets, No. 24*	4.06c.
Galvanized sheets No. 24*	4.76c.
Steel bands	4.41c.
Cold-finished bars	4.86c.

---

* Plus mill item extra.

MEMPHIS

	Base per Lb.
Mild steel bars	4.31c.
Shapes, bar size	4.31c.
Iron bars	4.31c.
Structural shapes	4.21c.
Plates	4.21c.
Hot-rolled sheets, No. 10	4.26c.
Hot-rolled annealed sheets, No. 24	4.91c.
Galvanized sheets, No. 24	5.66c.
Steel bands	4.56c.
Cold-drawn rounds	4.80c.
Cold-drawn flats, squares, hexagons	6.80c.
Structural rivets	5.15c.
Bolts and nuts, per cent off list	55
Small rivets, per cent off list	55

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	$3.30
Bolts and nuts, per cent off list	60

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	4.05c.	4.30c.	4.25c.
Shapes, standard	4.05c.	4.30c.	4.25c.
Soft steel bars	4.20c.	4.30c.	4.45c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.975c.	2.975c.	3.625c.
Hot-rolled annealed sheets (No. 24)	5.15c.	5.05c.	5.35c.
Hot-rolled sheets (No. 10)	4.30c.	4.50c.	4.50c.
Galv. sheets (No. 24 and lighter)	5.35c.	5.55c.	5.90c.
Galv. sheets (No. 22 and heavier)	6.10c.	5.70c.	5.90c.
Cold-finished steel Rounds	6.30c.	6.35c.	7.10c.
Squares and hexagons	8.05c.	8.10c.	7.10c.
Flats	8.55c.	8.60c.	8.10c.
Common wire nails—base per keg less carload	$3.65	$3.60	$3.70

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$54.00
First quality, New Jersey	56.00
Select, Ohio	49.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	49.00
Second quality, New Jersey	51.00
No. 1, Ohio	46.00
Ground fire clay, per ton	3.00

5 per cent trade discount on fire clay brick, except for New Jersey, quoted at net price.

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$54.00
Chicago District	53.00
Birmingham	54.00
Silica cement per net ton (Eastern)	9.50

5 per cent trade discount on silica brick.

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$49.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	49.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester, Pa.	$69.00
Chemically bonded, f.o.b. Baltimore	59.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	42.00
Domestic, f.o.b. Chewelah, Wash.	25.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$25.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	25.00
Delivered Brooklyn	27.27
Delivered Newark or Jersey City	26.39
Delivered Philadelphia	25.76
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo, Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	24.00
F.o.b. Jackson, Ohio	25.75
Delivered Cincinnati	24.07
F.o.b. Duluth	24.50
F.o.b. Provo, Utah	22.00
Delivered San Francisco, Los Angeles or Seattle	$26.50
F.o.b. Birmingham*	20.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 70 and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

Fo.b. Everett, Mass.	$25.75
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	24.50
F.o.b. Buffalo	23.00
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	23.50
Delivered Cincinnati	24.51
Delivered Canton, Ohio	24.76
Delivered Mansfield, Ohio	25.26
F.o.b. Jackson, Ohio	25.50
F.o.b. Birmingham	19.00

Bessemer

F.o.b. Everett, Mass.	$26.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	26.00
Delivered Boston Switching District	26.50
Delivered Newark or Jersey City	27.39
Delivered Philadelphia	26.76
F.o.b. Buffalo and Erie, Pa., and Duluth	25.00
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago..	24.50
F.o.b. Birmingham	25.50
Delivered Cincinnati	25.51
Delivered Canton, Ohio	25.76
Delivered Mansfield, Ohio	26.26

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	$28.50

Gray Forge

Valley or Pittsburgh furnace	$23.50

Charcoal

Lake Superior furnace	$27.00
Delivered Chicago	30.04

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$26.50
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$102.50

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$33.00
F.o.b. New Orleans	33.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	$69.50
50% (ton lots)	77.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$27.50

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

10.00 to 10.50%	$33.50
10.51 to 11.00%	34.00
11.01 to 11.50%	34.50
11.51 to 12.00%	35.00
12.01 to 12.50%	35.50
12.51 to 13.00%	36.00
13.01 to 13.50%	36.50
13.51 to 14.00%	37.00
14.01 to 14.50%	37.50
14.51 to 15.00%	38.00
15.01 to 15.50%	38.50
15.51 to 16.00%	39.00
16.01 to 16.50%	39.50
16.51 to 17.00%	40.00

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads	$1.80
Ferrotungsten, lots of 5000 lbs.	1.85
Ferrotungsten, smaller lots	1.90
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr per lb. contained Cr delivered, in carloads, and contract	10.50c.*
Ferrochromium, 2% carbon	16.50c. to 17.00c.*
Ferrochromium, 1% carbon	17.50c. to 18.00c.*
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.*
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.*
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y.	$2.50*
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	63.50
Ferrophosphorus, electric, 24%, in carlots, f.o.b. Anniston, Ala., per gross ton with $3 unitage, freight equalized with Nashville, Tenn.	80.00
Ferromolybdenum, per lb. Mo del.	95c.
Calcium molybdate, per lb. Mo del.	80c.
Silico spiegel, per ton, f.o.b. furnace, carloads	$45.00
Ton lots or less, per ton	50.00
Silico-manganese, gross ton, delivered.	
3%	101.50
2.50% carbon grade	106.50
2% carbon grade	111.50
1% carbon grade	121.50

* Spot prices are $5 a ton higher. Spot premium on 75 per cent ferrosilicon is $10 a ton.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Mesabi, Bessemer, 51.50%	5.10
Mesabi, non-Bessemer, 51.50%	$4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria, nominal	17.00c.
Iron, low phos., Swedish, average, 68½% iron	Nominal
Iron, basic or foundry, Swedish, aver. 65% iron	Nominal
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	52c.
Man., African, Indian, 44-48%	Nominal
Man., African, Indian, 49-51%	Nominal
Man., Brazilian, 46 to 48½%	Nominal

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid delivered nominal	Nominal
Tungsten, domestic, scheelite delivered	Nominal
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton:	
South African (low grade)	$16.00
Rhodesian, 45%	23.00
Rhodesian, 48%	26.75
Turkish, 48-49%	25.50 to $26.50
Turkish, 45-46%	23.50 to 24.00
Turkish, 44%	19.00 to 19.50
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:	
50%	$25.50 to $26.50
48-49%	24.50 to 25.00

FLUORSPAR

Per Net Ton

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$20.00
Domestic, barge and rail	22.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	$22.00 to 23.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	35.00

FUEL OIL

Per Gal.

F.o.b. Bayonne or Baltimore, No. 3 distillate	5.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial	5.25c.
Del'd Ch'go, No. 3 industrial	4.15c.
Del'd Ch'go, No. 5 industrial	4.00c.
Del'd Cleve'd, No. 3 distillate	5.75c.
Del'd Cleve'd No. 4 industrial	5.75c.
Del'd Cleve'd No. 5 industrial	5.00c.

COKE AND COAL

Coke	*Per Net Ton*
Furnace, f.o.b. Connellsville, Prompt	$4.35 to $4.60
Foundry, f.o.b. Connellsville, Prompt	5.00 to 6.25
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.85 to 11.30
Foundry, by-product, Philadelphia	10.60
Foundry, by-product, delivered Cleveland	11.00
Foundry, by-product, delivered Cincinnati	10.50
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	11.00 to 11.50
Foundry, from Birmingham, f.o.b. cars docks, Pacific ports	14.75

Coal	*Per Net Ton*
Mine run steam coal, f.o.b. W. Pa. mines	$1.50 to $1.75
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.90
Gas coal, ¾-in. f.o.b. Pa. mines	2.00 to 2.25
Mine run gas coal, f.o.b. Pa. mines	1.80 to 2.00
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45

Pig Iron Production Statistics for First Half of 1937

THE American Iron and Steel Institute has issued its detailed report of production of pig iron and ferroalloys in the United States during the first half of 1937. The total for the six months was 19,975,500 tons, which includes all ferroalloys whether made in blast furnaces or electric furnaces, also charcoal iron, whereas the monthly figures of THE IRON AGE include only coke pig iron, ferro-manganese and spigeleisen made in blast furnaces.

The total first half output compares with 13,367,785 tons in the first half of 1936, a gain of almost 46 per cent.

HALF-YEARLY PRODUCTION OF PIG IRON AND FERRO-ALLOYS BY STATES

States	Blast furnaces (a) In blast Dec. 31, 1936	Blast furnaces (a) June 30, 1937 In	Out	Total	Production First 6 months 1936	Second 6 months 1936	First 6 months 1937
PIG IRON:							
Mass.	0	1	0	1	932,244	1,288,278	1,420,179
New York	13	14	5	19			
Penna.	53	55	17	72	3,752,592	5,350,283	6,453,907
Maryland	5	6	0	6	965,692	1,136,414	1,323,105
West Va.	3	3	0	3			
Kentucky	1	2	0	2			
Tennessee	1	1	2	3			
Alabama	15	17	2	19	995,852	1,002,360	1,285,846
Ohio	36	35	10	45	3,227,197	3,979,458	4,175,367
Illinois	13	16	* 7	23	1,350,995	1,566,021	1,835,923
Indiana	15	14	4	18	1,890,895	2,277,404	2,558,190
Michigan	7	7	0	7			
Minnesota	2	2	0	2	252,318	248,544	429,485
Iowa	0	0	0	0			
Missouri	0	0	1	1			
Colorado	2	3	0	3			
Utah	1	1	0	1			
Total	167	177	48	225	13,367,785	16,848,762	19,482,002
FERRO-ALLOYS:							
New York	0	0	0	0	103,533	139,643	147,354
New Jersey	0	0	0	0			
Penna.	7	7	2	9	145,565	184,898	216,969
Virginia	0	1	0	1	49,067	25,761	46,047
West Va.	0	0	0	0			
Tennessee	0	0	2	2			
Alabama	0	1	0	1			
Ohio	2	1	1	2	86,182	77,991	83,128
Iowa	0	0	0	0			
Total	9	10	5	* 15	† 384,347	† 428,293	† 493,498
Grand total	176	187	53	240	13,752,132	17,277,055	19,975,500

(a) Completed and rebuilding pig iron furnaces.

* Blast furnaces only. Electric furnaces not included.

† Includes ferro-alloys made in electric furnaces.

HALF-YEARLY PRODUCTION OF PIG IRON BY GRADES AND FERRO-ALLOYS BY KINDS

BASIC PIG IRON

States	First 6 months 1936	Second 6 months 1936	First 6 months 1937
Massachusetts, New York	548,802	778,233	992,655
Pennsylvania	2,541,602	3,622,155	4,615,520
Maryland, West Va., Kentucky, Ala.	1,317,577	1,388,243	1,745,559
Ohio	1,991,322	2,393,477	2,484,959
Indiana, Illinois	2,142,227	2,634,767	3,024,193
Michigan, Minnesota, Colorado, Utah	526,071	592,445	677,365
Total	9,067,601	11,409,320	13,540,251

BESSEMER AND LOW-PHOSPHORUS PIG IRON

Pennsylvania	1,043,471	1,577,544	1,466,789
New York, Md., West Va., Ala.	255,096	313,506	339,359
Ohio	807,768	1,130,081	1,164,519
Indiana, Illinois	341,913	407,383	475,325
Total	2,448,248	3,428,514	3,445,992

FOUNDRY PIG IRON

Massachusetts, New York, Pennsylvania	277,017	327,917	429,143
Maryland, Ky., Tenn., Ala.	441,111	500,767	575,762
Ohio	73,174	92,762	143,020
Illinois, Mich., Minn., Col., Utah	175,067	143,176	241,479
Total	966,369	1,064,622	1,389,404

MALLEABLE PIG IRON

Massachusetts, New York, Pennsylvania	180,618	226,412	278,479
Ohio	348,874	356,540	377,372
Indiana, Illinois, Minnesota	299,533	305,080	399,447
Total	829,025	888,032	1,055,298

FERRO-ALLOYS BY KINDS

Ferro-manganese and spiegeleisen	177,284	217,835	237,335
Ferro-silicon	178,847	181,643	215,437
Other ferro-alloys	28,216	28,815	40,726
Total	384,347	428,293	493,498

PRODUCTION OF PIG IRON AND FERRO-ALLOYS IN THE FIRST 6 MONTHS OF 1937

(For Sale and for Maker's Use)

	For sale	For maker's use	Total
PIG IRON:			
Basic	916,285	12,623,966	13,540,251
Bessemer and low-phosphorus	138,689	3,307,303	3,445,992
Foundry	1,179,421	209,983	1,389,404
Malleable	922,777	132,521	1,055,298
Forge or mill	13,628	.....	13,628
White and mottled, direct castings, etc.	22,018	15,411	37,429
Total	3,192,818	16,289,184	19,482,002
FERRO-ALLOYS:			
Ferro-manganese and spiegeleisen	93,507	143,828	237,335
Ferro-silicon	215,195	242	215,437
Other ferro-alloys	40,567	159	40,726
Total	349,269	144,229	493,498
Grand total	3,542,087	16,433,413	19,975,500

FABRICATED STEEL

. . . Lettings at 17,560 tons increase from last week's level of 12,450 tons.

o o o

. . . New projects decline to 14,880 from 16,815 tons a week ago.

NORTH ATLANTIC STATES

Stockbridge, Vt., 150 tons, State bridge, to Bethlehem Steel Co., Bethlehem, Pa.

Newbury, Vt., 130 tons, State bridge, to Vermont Structural Steel Corp., Burlington, Vt.

Cambridge, Mass., 180 tons, buildings for B. B. Chemical Co., to New England Structural Co., Everett, Mass.

New York, 370 tons, Alexander Avenue bridge, Bronx Borough, to American Bridge Co., New York.

Manhasset, L. I., 116 tons, storage warehouse, to Dreier Structural Steel Co., New York.

Washington County, N. Y., 325 tons, State highway bridge, RC-3898, to Phoenix Bridge Co., Phoenixville, Pa.

Coxsackie, N. Y., 525 tons, building, to Leach Steel Co., Rochester, N. Y.

Bendix, N. J., 2000 tons, manufacturing plant, Bendix Aviation Corp. to Bethlehem Steel Co.

Trenton N. J., 5200 tons, manufacturing and office building, Ternstedt Division—General Motors Corp., to Bethlehem Steel Co.

Scranton, Pa., 210 tons, overhead highway bridge, for the City of Scranton, to American Bridge Co., Pittsburgh.

Pottstown, Pa., 320 tons, highway bridge, to Bethlehem Steel Co.

Lancaster, Pa., 130 tons, warehouse, to A. B. Rote Co., Lancaster, Pa.

Silver Spring, Washington, 270 tons, housing project, to Rosslyn Steel & Cement Co.

THE SOUTH

Norfolk, Va., 320 tons, two river crossing towers, to Lehigh Structural Steel Co., New York.

Greenup County, Ky., 275 tons, State bridge project WPGM-201, to Midland Structural Steel Co., Cicero, Ill.

Chatham County, Ga., 155 tons, highway project WPGH-2597, Taylor Iron Works & Supply Co., Macon, Ga.

Alabama, 110 tons, extension to fertilizer plant, Wilson Dam, to Decatur Iron & Steel Co., Decatur, Ill.

Nashville, Tenn., 585 tons, 3rd National Bank, to Vincennes Steel Co., Vincennes, Ind.

Kiowa County, Okla., 290 tons, bridge, to J. B. Klein Iron & Foundry Co., Oklahoma City.

Oklahoma City, 330 tons, bridge, to J. B. Klein Iron & Foundry Co.

CENTRAL STATES

Toledo, Ohio, 1000 tons, factory building and bridge, Libbey Glass Co., to Bethlehem Steel Co.

Niles, Ohio, 225 tons, building for General Electric Co., to Niles Forge Co., Niles.

Dearborn, Mich., 120 tons, furnace steel, to Whitehead & Kales, Detroit.

Pontiac, Mich., 215 tons, American Forging & Socket Co., plant addition, to Taylor & Gaskin Co., Detroit.

Detroit, 124 tons, two conveyer bridges and two substations, Lincoln Motor Car Co., to Taylor & Gaskin Co., Detroit.

Flint, Mich., 250 tons, press building addition, Fisher Body Corp., to R. C. Mahon Co., Detroit.

Port Huron, Mich., 4900 tons, contract No. 2, St. Clair River Bridge, State Bridge Commission of Michigan, to American Bridge Co., Pittsburgh.

Chicago, 300 tons, factory building, Tropic Aire, Inc., to Wendnagel & Co., Chicago.

Chicago, 655 tons, addition to Waller High School, to A. F. Anderson Iron Works, Chicago.

St. Louis, 250 tons, material for Armory building, for city of St. Louis, to Bethlehem Steel Co. and Superior Structural Steel Co., St. Louis.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

New York, 7210 tons, superstructure, west side elevated highway ramp, contract No. 18, president, borough of Manhattan; bids until Sept. 2. Contract also calls for 293 tons of silicon steel, 96 tons of cast steel and 212 tons of cast iron.

New York, 250 tons, building alterations, Interzone Corp.

Chaumont, Jefferson County, N. Y., 100 tons, school.

West New York, N. J., 240 tons, post office building, United States Goverament.

Scranton, Pa., 1000 tons, coal breaker, for Glen Alden Coal Co.

Wilmington, Del., 300 tons, high school.

Baltimore, 280 tons, building, Carr-Lowrey Glass Co.

WESTERN STATES

Eads, Colo., 230 tons, State highway bridge over Rush Creek, to American Bridge Co., Pittsburgh.

Denver, 140 tons, highway underpass, to Columbia Steel Co., Los Angeles.

North Hollywood, Cal., 300 tons, telephone building construction, to Pacific Iron & Steel Co., Los Angeles.

THE SOUTH

Norfolk, Va., 300 tons, two river crossing towers, Stone & Webster, Inc.

Charleston, W. Va., 340 tons, apartment building, Hyman & Mike Cohen.

CENTRAL STATES

Newark, Ohio, 410 tons, building, Owens-Illinois Glass Co.

Canton, Ohio, 100 tons, automobile sales rooms for James Schlemmer.

Cleveland, 100 tons, bridge for Southerly sewage disposal plant. Bids Aug. 26.

Cleveland, 250 tons, garage and laboratory building extensions, Electric Illuminating Co.

Sandusky, Ohio, 650 tons, car dumper, Pennsylvania Railroad Co.

Pontiac, Mich., 450 tons, warehouse, Baldwin Rubber Co., Leo J. Heenan, Pontiac, architect.

Lansing, Mich., tonnage unstated, $250,000 expansion two new plant units, Motor Wheel Corp., Reinger Construction Co., Lansing, general contractor.

Detroit, tonnage unstated, conveyer supports for coke ovens, Rouge Plant Ford Motor Co.

East Lansing, Mich., tonnage unstated, State police training school building to be erected under WPA Administrator, Louis M. Nims.

Kalamazoo, Mich., tonnage unstated, $350,000, dormitory, Western State Teachers College, Malcolmson, Calder & Hammond, Inc. Detroit, architect.

La Crosse, Wis., 2100 tons, Allis-Chalmers Mfg. Co. plant, bids due Aug. 30.

Peoria, Ill., 400 tons, dam, bids Sept. 13.

Evanston, Ill., 200 tons, post office, bids Sept. 17.

Pontiac, 200 tons, Pontiac Motor Co., addition plant 9, to Darin & Armstrong, Detroit, general contractor.

WESTERN STATES

Helena, Mont., 525 tons, reported last week, construction of five bridges, bids Aug. 27.

FABRICATED PLATES

AWARDS

Medford-Everett, Mass., 800 tons, 48-in. Metropolitan District Commission water main to Walsh's Holyoke Steam Boiler Works, Holyoke, Mass., reported last week as unstated location.

Providence, R. I., 250 tons, two tanks, New England Power & Service Co., to Chicago Bridge & Iron Works, Chicago.

San Francisco, 275 tons, Sunset reservoir, to Western Pipe & Steel Co., San Francisco.

Los Angeles, 150 tons, oil tanks for Metropolitan Water District, to Southwest Welding & Mfg. Co., Alhambra, Cal.

PENDING

Cleveland, 150 tons, gas holders for city of Cleveland.

SHEET PILING

AWARDS

Queens, N. Y., 4000 tons, piling for Beach Channel Drive, to Bethlehem Steel Co.

Ithaca, N. Y., 107 tons, bulkhead, to Bethlehem Steel Co.

Buffalo, 240 tons, Buffalo Sewer Authority, division 14, outfall sewer project, to Carnegie-Illinois Steel Corp., Pittsburgh.

NEW PROJECTS

Pittsburgh, 513 tons, for General Contracting Corp., unnamed project.

Pittsburgh, 115 tons, Emsworth dam, U. S. Engineers office.

Waukegan, Ill., 160 tons, harbor and dock project, previously reported as 1000 tons.

THIS WEEK'S MACHINE . . .TOOL ACTIVITIES. . .

. . . Lull noted in many centers, as trade lines up for substantial September volume.

o o o

. . . August business is far from dull, however; foreign inquiries and orders being maintained at high level.

o o o

. . . Delivery situation shows improvement as backlogs decline.

Pittsburgh

BOTH sentiment and business have improved somewhat since the earlier part of the month. Inquiries for miscellaneous tools increased considerably in the past week which may be due, in part, to the final stages of the vacation season. Orders, which had been only fair, are also showing renewed signs of activity. While dealers are not looking for the unprecedented and perhaps abnormal demand which occurred last spring, nonetheless a substantial fall business is expected. Meanwhile deliveries are a bit more improved, but this condition will not last long, should current inquiries develop into firm contracts in the near future. Westinghouse Electric & Mfg. Co. has been inquiring recently for a number of tools. Steel mill equipment makers are exceptionally busy, and current orders have not shown any downward trend.

New York

WHILE many important operating officials are away from their offices at the height of the vacation season, a surprisingly large number of machine tool purchases are being made at the present time. The fact that a number of pending inquiries will not be closed until after Labor Day possibly points to the good volume of business already reserved for that month. In recent weeks, orders have been placed by the Western Electric Co., Kearny, N. J., for about a dozen machines, including a lathe, milling machine and a number of single and multiple-spindle drill presses; Air Associates at Garden City, L. I., have acquired turret lathes, an automatic screw machine, some engine lathes and other equipment; and the Dexter Folder Co., Pearl River, N. Y., has bought a number of units. Worthington Pump & Machinery Co. has purchased a lathe for its Holyoke, Mass., plant. Other orders have come in single lots from a number of miscellaneous sources, including a large coal distributer in New York for truck and conveyor machinery repair. Heavy machines are moving well, including large-size press brakes and shears. One dealer reports orders in one week equal to all of his July business; others report the volume fairly equal or slightly below that of July. Export orders continue in good volume.

Inquiries are holding up well, and the prospects for future business are bright. The New York Central has inquired for a 24-in. lathe for its Beech Grove, Ind., shops, but has yet to close on any of the equipment asked for in the past month for the West Albany and Collingwood shops. The general contract has been awarded for the construction of the Bendix units at Bendix, N. J., and while budgets are being prepared in connection with the machinery to be installed there, no formal lists have been forthcoming. Preparations are going forward in connection with the move of the Carrier Engineering Corp. to Syracuse, N. Y., but no action has been taken in the last month on machinery.

Cincinnati

A LULL in machine tool demand is noticeable in this area. New business, while still encouraging for this period, is below the brisk level of several months ago, and trends are lacking. Some manufacturers, particularly drill makers, reported improved demand the past week, but this was offset by easing in other lines. Inquiry for all types of tools is brisk and gives substance to optimistic predictions for the fourth quarter. Foreign business is holding to substantial levels and on a proportional basis is a trifle better than domestic.

Factory operations are at about 75 per cent of capacity. Backlogs have been reduced, and the delivery situation eased greatly.

Detroit

INTEREST of machinery sales representatives centers now on the prospect of activity after Labor Day. One of the plants they will be called upon to supply is the expanded Motor Wheel Corp., Lansing. About $250,000 will be spent here on two building units and equipment for machining brake drums. The new Centrifugal Casting Co., a $750,000 foundry adjacent to Motor Wheel, will cast the drum linings in rings rolled by Motor Wheel, after which Motor Wheel will machine and assemble the brakes. Purchases of land have been made by Briggs Mfg. Co. and Chrysler Corp. for contemplated expansions. Hudson Motor Car Co. sold 17 acres and a storage building to Briggs, which is expected to erect a body hardware plant which will be equipped soon. Chrysler has an additional 13 acres adjacent to its Highland Park plant site for expansion purposes. Besides this, Chrysler last week paid a reported $255,000 for the old Graham-Paige plant near the approach to the Ambassador international bridge, ostensibly for storage space. A $75,000 expansion program for its stamping plant has been launched by American Forging & Socket Co., Pontiac, and a further expansion is contemplated.

Cleveland

ORDERS for machine tools continue rather light, with indications that the total for August will show little change from July. The trade is quite optimistic regarding an upward trend in September. Foreign inquiry is plentiful. The Galion Iron Works & Mfg. Co., Galion, Ohio, during the week purchased several machines against its recent lists. These include a radial drill, a heavy-duty drill and a boring machine. The Erie Railroad is inquiring for four or five tools.

A Cleveland manufacturer of automatic screw machines reports that its August shipments will break all previous records for the month. However, this company and other manufacturers state that their improvement in deliveries is very slight.

Chicago

MACHINE tool sales offices here report that incoming business is holding the gains noted a week ago and that there still is a tendency toward lengthening of deliveries. Demand from the farm implement and tractor makers is continuing strong. Allis-Chalmers still is placing sizable orders for tools required in its expansion program. Purchases of smaller lots by widely varied general industries are running to substantial volume in the aggregate. Favorable business is reported from tool and die shops. A leading seller reports a strong general demand for punch presses and good buying of radial drills. Standard tools appear to be favored in current expenditures for equipment.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

International Nickel Co., Ltd., 67 Wall Street, New York, has plans for one-story additions to branch plant at 15 Oak Street, Bayonne, N. J., to be equipped for foundry unit, and storage and distribution, respectively. Company also will build one-story addition to research and testing laboratory at same location. Entire project will cost close to $100,000 with equipment. Epple & Kahrs, 17 Washington Street, Newark, N. J., are architects. Company will carry out large expansion at main metal production plant at Copper Cliff, Ont., including sinking of new shaft, with installation of mining machinery, elevating, conveying and other mechanical-handling equipment; a new hoisting and loading plant will be built. Cost about $2,000,000 with machinery.

Duro Test Corp., 583 Broadway, New York, manufacturer of incandescent lamps and kindred electrical products, is arranging for early occupancy of new four-story building at North Bergen, N. J., totaling about 50,000 sq. ft. floor space, and will develop for main plant; equipment will be provided for large increase in present capacity.

American Gas & Electric Co., 30 Church Street, New York, has authorized expansion and improvements in steam-electric generating plant of Indiana & Michigan Electric Co., South Bend, Ind., a subsidiary interest, known as Twin Branch power station. Installation will include turbo-generator unit and accessories, high-pressure boilers, stokers, pumps, crane and auxiliary equipment. Work is scheduled for completion late in 1938. Company also will extend transmission lines in that area. Entire project will cost close to $4,000,000.

Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, has plans for new branch gasoline plant, with bulk storage and distributing terminal, at St. Louis, comprising two main units, one and two-story, 150 x 175 ft., and one-story, 75 x 150 ft., respectively, with cracking machinery and auxiliary equipment, steel tanks, pumping station and other mechanical facilities. Cost close to $200,000 with equipment. Preston J. Bradshaw, Inc., 718 Locust Street, is architect; and Morris F. Marks, 411 North Seventh Street, engineer, both St. Louis.

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until Aug. 30 for nickel-steel forged swivels for 1⅝-in. light-ship chain (Proposal 54630).

American Safety Razor Corp., 315 Jay Street, Brooklyn, has let general contract to Turner Construction Co., 420 Lexington Avenue, New York, for multi-story addition on Myrtle Avenue. Cost about $500,000 with equipment. William Higginson & Son, 101 Park Avenue, New York, are architects.

Wickwire-Spencer Steel Co., 41 East Forty-second Street, New York, has plans for one-story addition to plant at Palmer, Mass., primarily for storage and distribution. Cost close to $30,000 with equipment.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until Aug. 31 for alloy steel forging lining tubes for 12-in. gun (Proposal 9).

Atlas Steel Barrel Co., 27 Hudson Boulevard, Bayonne, N. J., has let general contract to Austin Co., 16112 Euclid Avenue, Cleveland, for rebuilding portion of plant destroyed by fire a number of weeks ago, including new addition. Cost close to $100,000 with equipment.

Commanding Officer, Ordnance Department, Picatinny Arsenal, Dover, N. J., asks bids until Aug. 30 for 31,000 forgings for packing stop (Circular 76), 130,000 primer and charge cups (Circular 77), quantity of steel wire screens (Circular 78), quantity of taps (Circular 79); until Aug. 31 for quantity of steel music wire (Circular 83); until Sept. 1 for quantity of seamless brass tubing (Circular 84).

Bond Mfg. Corp., Sixteenth and Locust Streets, Wilmington, Del., manufacturer of metal bottle seals and caps, and kindred metal goods, has let general contract to John E. Healy & Son, 707 Tatnall Street, for one and two-story addition. Cost over $50,000 with equipment. Robinson, Stanhope & Manning, Equitable Building, are architects.

Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until Aug. 31 for quantities of screws (Aero Req. Nos. 667 and 668).

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until Aug. 30 for 25 annealing trays for holding cartridge cases (Circular 76), one motor-driven internal grinding machine (Circular 84); until Aug. 31 for one mechanical mandrelling press (Circular 87), two motor-driven internal grinding machines (Circular 89), one marking press for stamping base of medium size cartridge case (Circular 90); until Sept. 1 for two head-turning and trimming machines (Circular 69), one mechanical mandrelling press (Circular 70), one 2000-ton capacity heading press (Circular 71).

BUFFALO DISTRICT

Fedders Mfg. Co., 57 Tonawanda Street, Buffalo, manufacturer of automobile radiators, electric refrigeration equipment, parts, etc., has let general contract to George W. Walker, Inc., 770 Elmwood Avenue, for one-story addition, about 10,000 sq. ft. floor space, to be equipped primarily as a tube-bending shop. Cost close to $45,000 with equipment. Robert A. Hill, 132 Shoshone Avenue, is architect.

Niagara Alkali Co., 4205 Buffalo Avenue, Niagara Falls, N. Y., has let general contract to Scrufari Construction Co., 825 Fifteenth Street, for two three-story additions on Adams Avenue, primarily for storage and distribution. Cost about $60,000 with equipment.

NEW ENGLAND

Greenfield Tap & Die Corp., Sanderson Street, Greenfield, Mass., has let general contract to Thomas J. Gass Co., 79 Davis Street, for one-story and basement addition. Cost close to $30,000 with equipment.

Hoffman Terminal Co., 100 Southfield Avenue, Stamford, Conn., has let contract for group of one-story buildings to Vuono Construction Co., 1 Atlantic Street, for new bulk oil storage and distributing plant on local site. Cost close to $100,000 with steel tanks, pumping machinery and other operating equipment.

G. F. Heublein & Brother, Inc., Hartford, Conn., manufacturer of liquor products, has arranged for purchase of former local plant of SKF Industries, Inc., manufacturer of ball and roller bearings, etc., comprising group of one and multi-story buildings, about 170,000 sq. ft. of floor space, on nine-acre tract of land. New owner will remodel and improve, and will equip for new plant for large capacity at early date. Cost over $100,000 with equipment.

Wyman-Gordon Co., Madison Street, Worcester, Mass., manufacturer of automobile forgings and kindred products, has let general contract to E. J. Cross Co., 82 Foster Street, for one-story addition, 80 x 175 ft., to be equipped as a crane building.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Aug. 30 for 15,000 ft. of rubber-covered wire (Circular 24).

WASHINGTON DIST.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Sept. 13 for quantity of parts for motor-driven fire trucks, engines, etc., including copper and brass tubing, castings, tools, cable, electrical equipment, lubricating fittings, etc. (Proposal 398-8).

Virginia Electric & Power Co., Richmond, Va., plans extensions and improvements in steam-operated electric generating station on Reeves Avenue, Norfolk, Va., including installation of additional equipment. Extensions will be made in transmission lines at Norfolk and vicinity. Cost about $400,000 with equipment.

Commanding Officer, Ordnance Department, Aberdeen Proving Grounds, Aberdeen, Md., asks bids until Aug. 31 for quantity of stove and machine bolts, screws, rivets, washers, galvanized pipe couplings, weatherproof wire, snap switches, etc. (Circular 21).

Board of District Commissioners, District Building, Washington, plans three-story addition to Dennison Vocational School, 1300 Allison Street, N.W. Cost close to $325,000 with equipment.

Southern Maryland Tri-County Cooperative Association, Inc., Welcome, Md., Wendell M. Reed, president, has plans for new steam-electric generating plant in vicinity of Popes Creek, Md., for service for rural power lines, with installation to include diesel engine-generator units and auxiliary equipment. Cost about $50,000. Entire project will cost $215,000 with rural electrification system. Financing has been secured through Federal aid.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 31 for 3000 sets of metal stampings (Schedule 1434) for Portsmouth Navy Yard; for quantity of admiralty metal and copper-nickel alloy condenser tubes (Schedule 1431); until Sept. 7 for pipe-threading machine and one set of chasers (Schedule 1475), two motor-driven pumping units (Schedule 1457) for Eastern and Western Navy Yards; 52 aluminum or corrosion-resisting steel steam-jacketed kettles, 30-gal. capacity, for Eastern and Western yards, and seven similar kettles, each 80-gal. capacity, for Brooklyn Navy Yard (Schedule 1458); quantity of corrosion-resisting steel wire mesh (Schedule 1465) for Norfolk yard.

SOUTH ATLANTIC

Fernandina Pulp & Paper Co., Fernandina, Fla., recently organized as a subsidiary of Rainier Pulp Paper Co., Shelton, Wash., has let general contract to Rust Engineering Co., Clark Building, Pittsburgh, for new bleached sulphite pulp mill on 175-acre tract of land on Amelia River, harbor district, Fernandina, recently acquired. It will comprise several large one and multi-story units to be equipped for initial capacity of 180 tons of pulp per day, with power house, pumping station and other mechanical structures. It is scheduled for completion in July, 1938. Cost over $5,000,000 with machinery. C. B. Morgan is president.

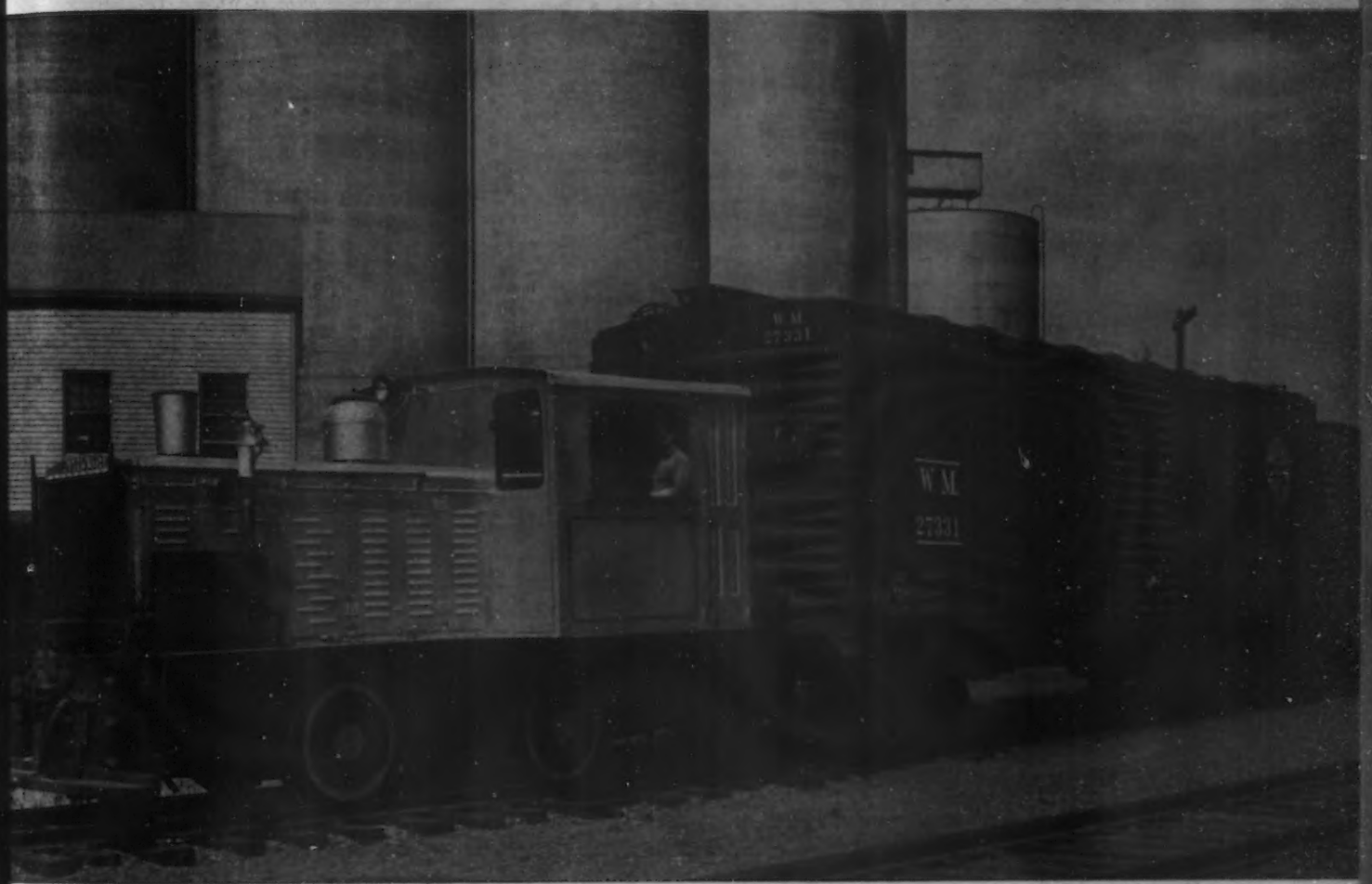
Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 7 for quantity of aircraft propeller blades and aircraft propeller hubs for Pensacola, Fla., Naval Air Station (Schedule 1462).

Ohio Power Co., a subsidiary of the American Gas & Electric Co., has awarded contract to Rust Engineering Co., Pittsburgh, for a new boiler house, auxiliary switch room and transformer structure to be erected at Power, W. Va., as part of a $3,000,000 improvement program.

SOUTH CENTRAL

Frankford Distillery, Inc., Columbia Building, Louisville, has asked bids on general contract for one-story addition, 220 x 335 ft., to be equipped primarily as a mechanical-bottling unit. Cost over

SERVICE AND PERFORMANCE REACH HIGH PEAK!



Check PLYMOUTH'S Outstanding Record of Service for N.B.C. With Your Haulage Figures . . . THEN DECIDE!

●If you're looking for an industrial locomotive that's as dependable as the day is long—just read these facts and figures gathered at the *National Milling Branch of National Biscuit Company,* Toledo, Ohio.

Here's a locomotive that's put through the paces from dawn to dawn, 24 hours a day. Eight cars per hour go to the car dumper and each time a car is moved the locomotive starts and stops *six times.*

Yes, it's a true test for genuine dependability yet, *in seven years,* the NBC Plymouth has been down only once.

Check Plymouth's record of performance and economical operation with your own haulage figures—you've a surprise coming.

PLYMOUTH LOCOMOTIVE WORKS
(Division of The Fate-Root-Heath Co.)
PLYMOUTH OHIO

PLYMOUTH

GASOLINE • DIESEL • ELECTRIC • BUTANE • PROPANE

INDUSTRIAL LOCOMOTIVES

$100,000 with equipment. Carl J. Epping, 806 East Broadway, is architect.

United States Engineer Office, Vicksburg, Miss., asks bids until Aug. 31 for 11,035 machine bolts and 15,400 lbs. of steel boat spikes (Circular 24), one motor-driven stationary air compressor (Circular 26); until Sept. 2 for quantity of cast steel ball joints, cast steel elbows, discharge elbows, valves, etc. (Circular 27), two portable motor-driven bilge pumps for Batesville, Miss. (Circular 29).

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Aug. 31 for one gasoline engine-driven electric generating unit and auxiliaries for power house at Pickwick Landing; until Sept. 3 for designing, furnishing and delivering one automatic electric elevator, same power station.

Tennessee Electric Power Co., Chattanooga, Tenn., has plans for steam-operated electric generating station at Nashville, Tenn., with installation of turbo-generator units, high-pressure boilers, stokers, pumps and auxiliary equipment. Cost about $2,000,000 including transmission lines. Permission has been granted, including authority for bond issue of $1,500,000 to defray part of cost.

WESTERN PA. DIST.

Aero Supply Mfg. Corp., West Main Street, Corry, Pa., manufacturer of screw products for aircraft, has let general contract to Upton-Lang Co., 1009 Commerce Street, Erie, Pa., for two-story addition, 75 x 85 ft. Cost about $50,000 with equipment. Fred A. Fuller, Commerce Building, Erie, is architect.

Jones & Laughlin Steel Corp., Third Avenue and Ross Street, Pittsburgh, plans new pier with one-story storage and distributing building on waterfront site, Wolf River, Memphis, Tenn., with mechanical-handling equipment for unloading, elevating, conveying, etc. Cost close to $100,000. Local branch of company is at foot of Auction Street; Ernest W. Harwell is manager at Memphis.

Speer Carbon Co., St. Marys, Pa., manufacturer of carbon electrodes, plates, etc., has let general contract to Walter Johnson Building Co., Inc., 2532 Hyde Park Boulevard, Niagara Falls, N. Y., for one-story addition, 80 x 180 ft. Cost close to $50,000 with equipment.

SOUTHWEST

Mechanics Iron Works, 628 Edmund Street, St. Louis, manufacturer of iron and steel specialties, has plans for one-story addition, 50 x 250 ft. Cost over $70,000 with equipment. C. C. Ramming is head.

City Council, Washington, Kan., asks bids until Sept. 1 for equipment for new municipal electric power plant, including diesel engine-generator units and auxiliary equipment. Cost about $100,000. E. T. Archer & Co., New England Building, Kansas City, are consulting engineers.

Ralston Purina Co., 835 South Eighth Street, St. Louis, has plans for new one and multi-story branch plant on Tryon Street, Charlotte, N. C., where site has been acquired. Cost about $65,000 with milling machinery and other equipment.

Ford Motor Co., Dearborn, Mich., has taken options on tract of about 300 acres of land on Mississippi River, St. Louis County, Mo., vicinity of St. Louis, as site for new branch assembling plant, comprising group of one and multi-story units, pumping station, power house and other mechanical departments. Cost over $600,000 with equipment.

Board of Education, 410 South Cincinnati Street, Tulsa, Okla., plans manual training department in new four-story Will Rogers high school, 250 x 390 ft., for which general contract has been let to Manhattan Construction Co., Manhattan Building, Muskogee, Okla. Cost close to $1,300,000. A. M. Atkinson, Thompson Building, is supervising architect; Leon B. Senter and Joseph Koberling, Philtower Building, are associate architects, all Tulsa.

Cameron Iron Works, Milby Street, Houston, Tex., manufacturer of iron and other metal products, has let general contract to General Contracting Co., 2310 Leeland Street, for one-story addition, 105 x 110 ft. Cost over $45,000 with equipment.

Rio Grande Valley Citrus Exchange, 522 Texas Street, Weslaco, Tex., John N. Hagar, manager, has let general contract to Noser Construction Co., Pharr, Tex., for new one-story processing plant, 100 x 200 ft., at Mission, Tex., for production of fruit juices and other fruit products. Cost about $75,000 with machinery.

OHIO AND INDIANA

Great Lakes Welding & Boiler Co., 1724 Rockwell Avenue, Cleveland, has asked bids on general contract for one and one-half story addition, 60 x 106 ft. Cost close to $40,000 with equipment.

Youngstown Steel Car Corp., Hunter Street, Niles, Ohio, is considering one-story addition, 80 x 200 ft. Cost over $75,000 with equipment.

Apex Electrical Mfg. Co., 1070 East 152nd Street, Cleveland, manufacturer of electric household products, has acquired Zephyr air-conditioning division of Savage Arms Corp., Utica, N. Y., and will take over and develop for new branch of production, including complete air-conditioning units for domestic and other service. Equipment will be transferred from Utica to Cleveland plant, where increased facilities will be arranged for new line of output. C. G. Frantz is president of Apex company.

Contracting Officer, Materiel Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until Aug. 30 for 200 charging control cable clevis, tow target windlass rewind drive gear-housing, tow target cable pulley support assemblies (Circular 89); until Aug. 31 for 6000 metal sheets (Circular 102); until Sept. 1 for quantity of aircraft parts, including flotation gear brackets, shims, washers, flotation guards, etc. (Circular 54), 2500 to 3300 tow target release assemblies, 7000 to 8600 tow target lead rope assemblies, 2199 to 2600 tow target release drags, and 750 tow target release cable cones (Circular 77); until Sept. 2 for quantity of fixture assemblies, plug assemblies, jack assemblies, miscellaneous puller assemblies, pistons, wrenches, etc. (Circular 95).

Newman Foundry Co., Kendallville, Ind., manufacturer of gray iron castings, plans rebuilding of portion of foundry recently destroyed by fire. Loss close to $30,000 with equipment.

City Council, City Hall, Crawfordsville, Ind., plans extensions and improvements in municipal electric power plant, including installation of new 5000-kw. turbo-generator unit, boilers and auxiliary equipment. Cost close to $285,000.

MICHIGAN DISTRICT

Chrysler Corp., 341 Massachusetts Avenue, Detroit, has plans for new plant on Mound Road, near Eight-Mile Road, Macomb County, vicinity of Detroit city limits, for manufacture of small motor trucks, about ½-ton capacity. Main unit will be one and two-story, 402 x 1260 ft., for parts production and assembling, with adjoining one-story structure, 108 x 120 ft., to be used for export service. Cost over $650,000 with equipment. Albert Kahn, Inc., New Center Building, is architect and engineer.

City Council, Kalamazoo, Mich., asks bids until Sept. 1 for extensions and improvements in municipal electric power plant, including turbo-generator unit and accessories, boilers, condenser, pumping machinery, heat-balancing equipment and auxiliary equipment. Cost about $265,000. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, is consulting engineer.

Ternstedt Mfg. Co., 6307 West Fort Street, Detroit, manufacturer of automobile hardware and kindred products, a division of General Motors Corp., has let general contract to John McShain, Inc., 1610 North Street, Philadelphia, for new plant on 97-acre tract of land in Ewing Township, near Trenton, N. J., recently acquired. It will consist of a main one and two-story unit, with several adjoining buildings, totaling about 900,000 sq. ft. floor space. Cost about $5,000,000 with equipment. Plant is scheduled for completion early in 1938. Roland E. Weinert, heretofore executive assistant at main plant at Detroit, will be manager at Trenton in future.

MIDDLE WEST

McGraw Electric Co., 120 South LaSalle Street, Chicago, manufacturer of electric heating and cooking equipment and other domestic electric devices, has closed bids on general contract for new one and two-story plant, 250 x 450 ft., near Elgin, Ill. Cost about $275,000 with equipment. Olsen & Urbain, 228 North LaSalle Street, Chicago, are architects.

Standard Oil Co. of Indiana, Inc., 910 South Michigan Avenue, Chicago, has plans for expansion and improvements in main refining plant at Whiting, Ind., including installation of equipment, steel storage and distributing tanks and facilities; a large part of work will be in gasoline division, where additional cracking machinery and auxiliary equipment will be installed. Cost over $2,000,000.

Quartermaster, Fort Omaha, Omaha, Neb., asks bids until Sept. 2 for quantity of oil burners (Proposal 645-7).

City Council, Bemidji, Minn., asks bids until Aug. 30 for new municipal electric light, heat and power plant, including engine-generator units, boilers and complete equipment. Rose & Harris, Engineers, Inc., Essex Building, Minneapolis, Minn., is consulting engineer.

Lindberg Engineering Co., 219 North Union Park Court, Chicago, manufacturer of mechanical equipment, has let general contract to Magnussen & Wold, 4322 West Drummond Place, for one-story plant unit at 1433-35 North Fulton Street, to be equipped as an assembling shop. Cost close to $40,000 with equipment. Robert C. Ostergren, 4300 North Clark Street, is architect.

Titan Abrasives Co., 1348 West 59th Street, Chicago, manufacturer of grinding wheels and other industrial abrasive products, has purchased three one-story buildings on site 115 x 216 ft., at West 59th and Bishop Streets, heretofore used by Apex Mfg. Co., manufacturer of electrical products. Titan company will improve and equip for new plant. Cost over $50,000 with equipment.

City Council, Corning, Iowa, asks bids until Sept. 7 for extensions in municipal electric power plant, including new diesel engine-generator unit and auxiliary equipment. Cost about $50,000. Bruce B. Watts is secretary of board of trustees of lighting plant, in charge.

PACIFIC COAST

Armstrong Cork Co., Lancaster, Pa., manufacturer of flooring, insulation products, etc., has acquired tract of about 26 acres of land near Atlantic Boulevard, Los Angeles, as site for new plant for Pacific Coast territory. It will comprise several one and multi-story units, with power house, machine shop and other mechanical divisions. Cost close to $1,000,000 with machinery. Project will be carried out by Armstrong Cork Co. of California, Inc., a subsidiary.

Associated Oil Co., 79 New Montgomery Street, San Francisco, has let general contract to Dinwiddie Construction Co., Crocker Building, for one-story addition to Avon oil refinery, Martinez, Cal., to be used as a steel drum building and for storage and distribution. Cost close to $75,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 3 for 14 preheater air intake assemblies (Schedule 900-1052); until Sept. 7 for two industrial engine-driven gasoline tractors (Schedule 1474) for San Diego, Cal., Naval Air Station.

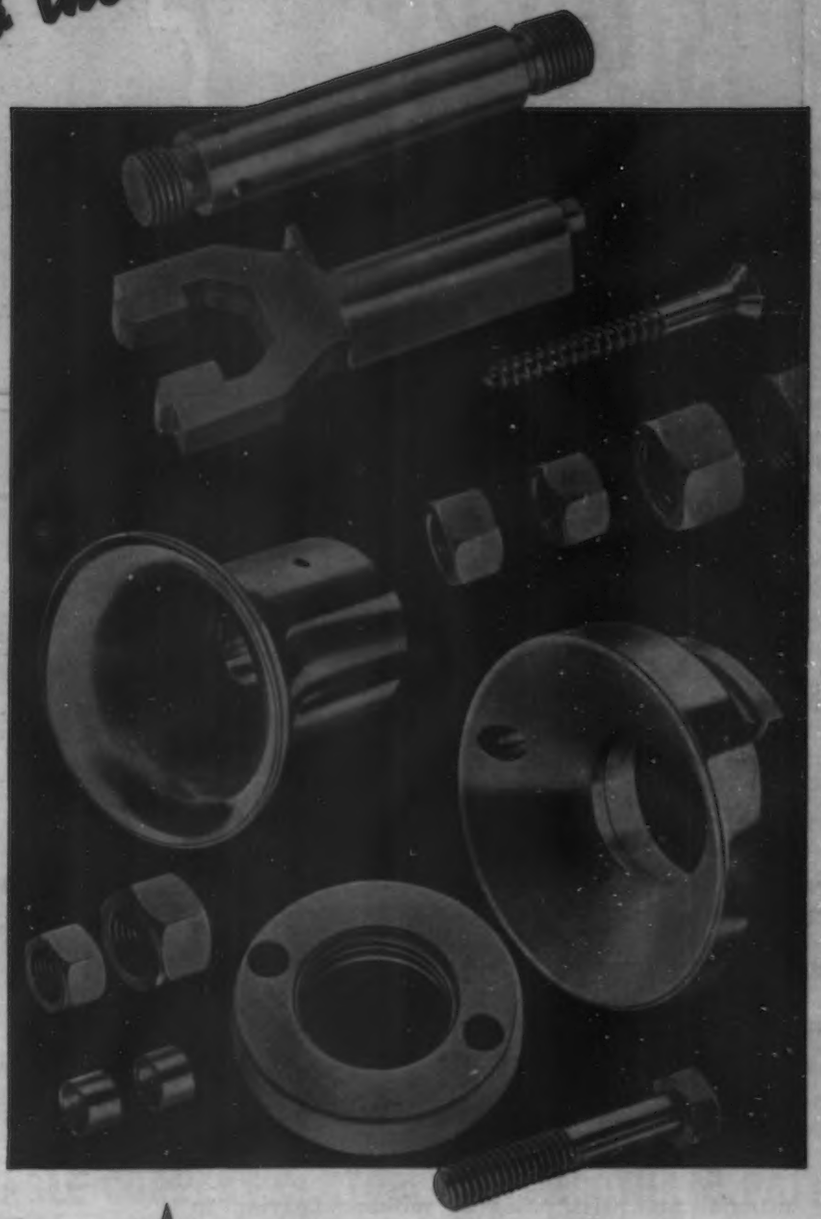
American Brake Shoe & Foundry Co., N.W. 107th Street, Portland, has let general contract to Harry S. Green, Couch Building, for one-story foundry at plant.

Bureau of Reclamation, Custom House, Denver, Colo., asks bids until Aug. 31 for steel water tank, 150,000-gal. capacity, at Government camp, Kennett Dam, Central Valley Project, Cal. (Specifications 964-D); until Sept. 2 for construction of Succor Creek pumping plant, Owyhee Project, Oregon-Idaho (Specifications 963-D).

Lemoore Union High School District, Avenal, Cal., has let general contract to N. H. Sjoberg & Son, 5604 East 16th Street, Oakland, Cal., for one-story vocational shop addition to local high school. Cost close to $100,000 with equipment. H. H. Weeks, 593 Market Street, San Francisco, is architect.

American Cracker Co., 1461 Elliott Avenue, Seattle, manufacturer of food products, has let general contract to Austin Co., Dexter-Horton Building, for second-story top addition to present one-story plant unit, 40 x 150 ft. Cost close to $50,000 with equipment.

★Geared to the machining age



Decreased rejects . . . reduced tool wear . . . increased cutting speeds . . . more lustrous finish . . . freedom from galling and seizing . . . all these advantages are obtainable through the use of the free-cutting grades of Rustless Stainless Steel.

★Defirust-Machining . . . (Type 416) a free-cutting 12% to 14% chromium stainless steel.

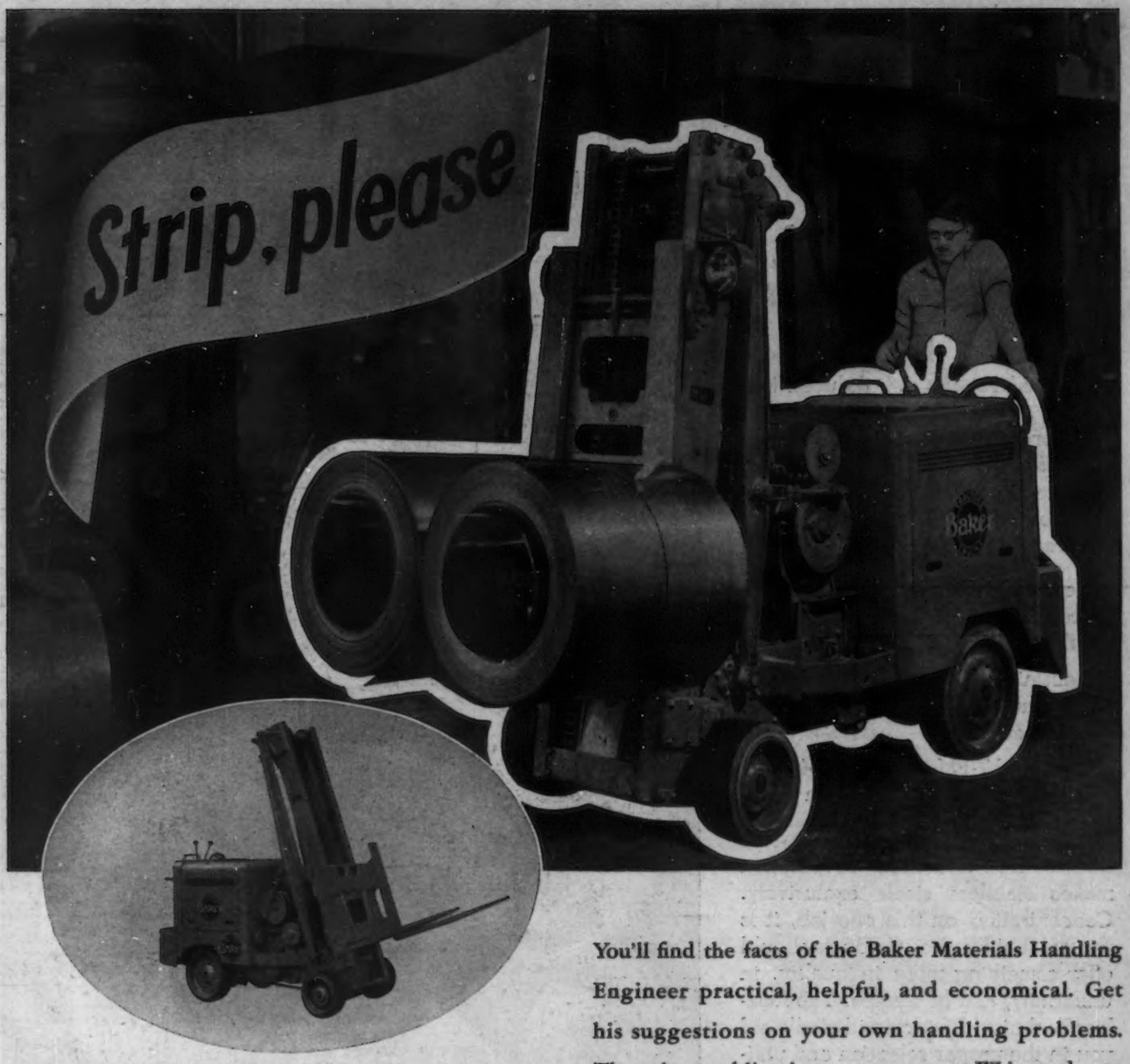
★Defistain-Machining . . . (Type 303) a free-cutting 18-8 chromium-nickel stainless steel.

★Rustless 17-FM. . . . (Type 430-F) a free-cutting 17% chromium stainless steel.

Rustless Iron and Steel Corporation makes stainless steels exclusively. Concentrating on this one job, it is natural that Rustless products should offer something more in quality, in uniformity, and in service. The Rustless Technical Division will gladly aid you in the proper selection and utilization of the grade of Rustless bar or wire best suited to your needs.

RUSTLESS IRON AND STEEL CORPORATION
Baltimore, Maryland

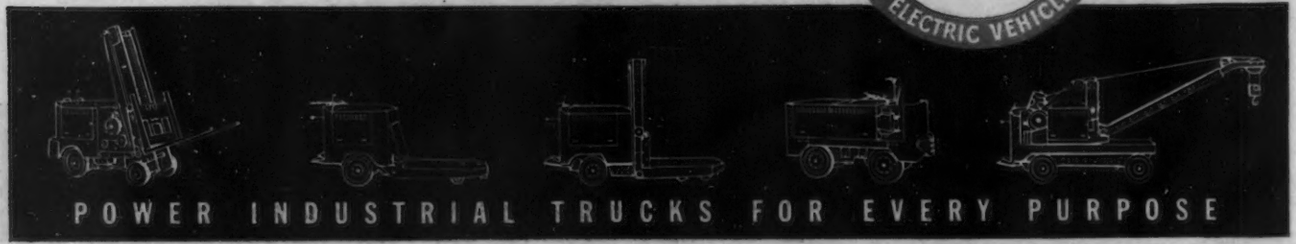
RUSTLESS
CORROSION AND HEAT-RESISTING STAINLESS STEELS



When the mills are calling for strip . . . when stepped-up schedules demand faster and faster handling—you'll find Baker Trucks in the thick of it. In every industry Baker Trucks are speeding up the flow of materials and parts, piling up substantial savings in the face of mounting costs, and holding those savings through year-in-year-out operation.

You'll find the facts of the Baker Materials Handling Engineer practical, helpful, and economical. Get his suggestions on your own handling problems. There is no obligation on your part. Write today to BAKER INDUSTRIAL TRUCK DIVISION *of the Baker Raulang Company,* 2175 W. 25th St. Cleveland, Ohio.

OLDEST MANUFACTURER
Baker
TRADE-MARK REG. U.S. PAT. OFF.
OF ELECTRIC VEHICLES



HERE'S SMOOTH CONTROL *without a break*

FOR ANY DEGREE OF WELDING HEAT OVER ITS ENTIRE RANGE...

There is no limit to the tones, overtones and undertones you can draw from a violin. There are no divisions, no frets—wherever you touch the string to the finger board, it responds. This same principle is used on the P&H-Hansen Smootharc Welding Generator. From top to bottom—over its entire welding range, wherever you move the current setting, the generator delivers the exact amount of current indicated. There is no limit to the number of current settings you can make with this micrometer control.

Once the amperage is selected, the open-circuit voltage is automatically regulated. There is no chance for the operator to blunder in selecting the proper open-circuit voltage.

SMOOTHARC WELDERS

Ask us to send you the new Smootharc Bulletin (W-10) which explains these outstanding features in detail. Write today.

NOW TRY THIS NEW WELDING ELECTRODE

SMOOTHARC A P

FOR FLAT, VERTICAL OR OVERHEAD WELDING ON MILD STEEL

Designed for DC welding on reverse polarity; gives you a stable arc with very little spatter loss. Produces fast, clean welds with no undercut; slag is removed with remarkable ease. Deposits metal with tensile strength from 65,000 to 70,000 lbs. per sq. in. Elongation of 25% in 2"—resistance to impact of 30 to 60 ft. lbs. (Izod). Sizes from 1/8" to 3/8". Test samples sent free on request.

SINGLE CURRENT CONTROL—A SMOOTHARC PATENT

The P&H-Hansen system of single current control is found exclusively on Smootharc welders. It is simple, foolproof. It takes the guesswork out of current settings, minimizes the human element, leaves nothing to chance to result in faulty welds. Whether you use bare or coated electrodes, you are always sure that the necessary high, open-circuit voltage is maintained at all times. For complete performance data, address the Harnischfeger Corporation.

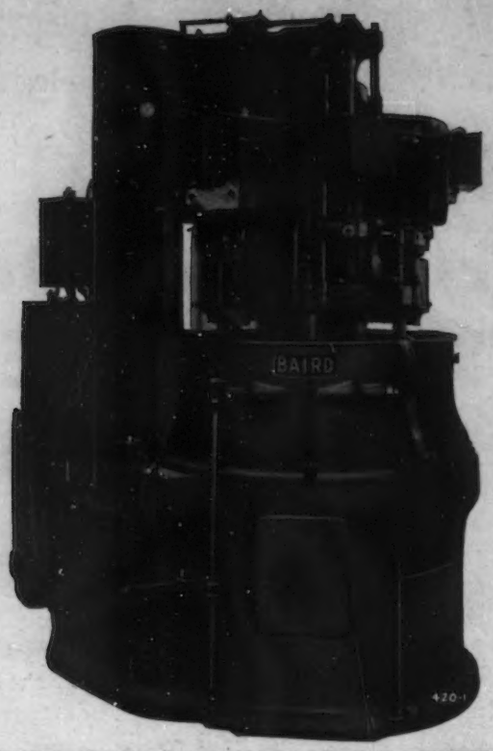
4401 WEST NATIONAL AVENUE
MILWAUKEE, WISCONSIN

HARNISCHFEGER CORPORATION

ARC WELDERS • EXCAVATORS • ELECTRIC CRANES P&H MOTORS • HOISTS • WELDING ELECTRODES

BAIRD MACHINE COMPANY

BRIDGEPORT, CONNECTICUT



Like Baird Automatic Lathes and Chucking Machines, Baird Grinders are built both horizontal and vertical. Mechanical features are the same as enumerated above plus automatic truing and sizing of grinding wheels.

Wheels may be adjusted or changed at any station without disturbing the others and different sized wheels may also be used. Additional flexibility of operation is afforded by the fact that different diameters may be ground with one pass through the machine and by means of swivel heads which are provided for angular grinding.

Let our engineers study your own particular problem and make specific recommendations.

Baird Automatic Multiple Spindle

GRINDERS

CROSBY *for* STAMPINGS

Serving Industry Since 1896

ALL our efforts have been concentrated on one product — STAMPINGS — for 40 years. We have made stampings, deep, intricate, heavy, light, large and small, for nearly every branch of industry.

Get Acquainted With Crosby Service

THE CROSBY COMPANY

General Offices and Works: BUFFALO, NEW YORK

Branch Offices: Chicago Detroit Cleveland New York Philadelphia

PAGE

Hi-Tensile "C" Shielded Arc Electric Welding Electrodes are real "all position" rods

OVERHEAD POSITION

VERTICAL POSITION

FLAT POSITION

● Page Hi-Tensile "C" produces sound welds in any position—overhead, vertical or horizontal. It is easy to handle in crowded quarters. It permits high speed welding with low spatter or slag loss . . . equally good for production or shop work.

Welds made with Hi-Tensile "C" comply with the most rigid requirements. They meet tests of 65,000 to 75,000 pounds for tensile strength. They pass specifications for 20 to 30 per cent elongation, impact resistance of 30 to 70 foot pounds and fatigue resistance of 28,000 to 32,000 pounds per unit.

Like all Page Wires, Hi-Tensile "C" Electrodes are shop-tested. You can be sure of their uniformity and excellence.

Your local Page distributor carries an ample supply of Hi-Tensile "C" electrodes. He also has other Page Welding Wires . . . a complete line that meets every welding requirement. If you have a welding problem call on Page.

PAGE STEEL & WIRE DIVISION
AMERICAN CHAIN & CABLE COMPANY, Inc.
MONESSEN, PENNSYLVANIA

In Business for Your Safety

BUY ACCO QUALITY

A FEW OF THE 137 AMERICAN CHAIN & CABLE INDUSTRIAL PRODUCTS

AMERICAN CHAIN DIVISION
(DOMINION CHAIN COMPANY, Ltd., in Canada)
Weed Tire Chains • Welded and Weldless Chain • Malleable Castings • Railroad Specialties

AMERICAN CABLE DIVISION
Tru-Lay Preformed Wire Rope • Tru-Loc Processed Fittings • Crescent Brand Wire Rope Tru-Stop Brakes

ANDREW C. CAMPBELL DIVISION
Abrasive Cutting Machines • Floformers Special Machinery • Nibbling Machines

FORD CHAIN BLOCK DIVISION
Chain Hoists • Trolleys

HAZARD WIRE ROPE DIVISION
Green Strand Wire Rope • "Korödless" Wire Rope • Preformed Spring-Lay Wire Rope • Guard Rail Cable

HIGHLAND IRON & STEEL DIVISION
Wrought Iron Bars and Shapes

MANLEY MANUFACTURING DIVISION
Automotive Service Station Equipment

OWEN SILENT SPRING COMPANY, Inc.
Owen Cushion and Mattress Spring Centers

PAGE STEEL AND WIRE DIVISION
Page Fence • Wire and Rod Products Traffic Tape • Welding Wire

READING-PRATT & CADY DIVISION
Valves • Electric Steel Fittings

READING STEEL CASTING DIVISION
Electric Steel Castings, Rough or Machined

WRIGHT MANUFACTURING DIVISION
Chain Hoists • Electric Hoists and Cranes

ACCO

PAGE *Welding* WIRE

WHEN IN NEED OF

MACHINE SCREWS — SPECIAL STUDS
MACHINE SCREW NUTS — SPECIAL SCREWS

COMMUNICATE WITH
THE HOUSE OF SERVICE

THE PROGRESSIVE MANUFACTURING CO.
TORRINGTON, CONN.

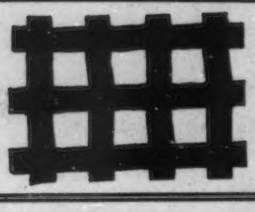
We please those discriminating manufacturers who not only demand quality but service as well. Business goes where it is invited and remains where it is well treated. The illustration reveals a few only of the possibilities that are developed by the cold heading process.

THE ATHENIA STEEL CO.

Clifton Ave., Clifton, N. J. — Works, Athenia, N. J.

Makers of High Grade Tempered and Polished Steel for Clock, Watch, Motor and Typewriter Springs. Also Wound Springs. Tempered and Untempered Steel for other purposes. Special quality equal to finest imported for finish and accurate rolling. Also Stainless Steels of various grades.

AGENTS:—
Lapham Hickey Co.—3333 W. 47th Place, Chicago, Ill.—414 United Artists Bldg., Detroit, Mich.
E. F. Krause & Co.—430-440 Commercial St., Los Angeles, Calif.
Hill Chase & Co.—Richmond and Ontario Sts., Philadelphia, Pa.
Wetherell Bros. Co.—251 Albany St., Cambridge, Mass.



MICHIGAN WIRE CLOTH CO.

ESTABLISHED 1864

EVERYTHING IN WIRE CLOTH

Pioneers in the manufacture of DOUBLE CRIMP WIRE CLOTH and WIRE SCREENING of every kind possible to weave, made of Steel, Iron, Brass, Copper, Bronze, Aluminum, German Silver, Pure Nickel, Galvanized, Tinned, Monel, Manganese, Zinc and Stainless Steel; also Wire Lath, etc.
Also drawers of Brass, Copper, Bronze, German Silver, Pure Nickel, Aluminum, Monel Metal, Wire, etc.

2117 HOWARD STREET, DETROIT, MICH. — Write for Catalogue No. 25

TRACK SPIKES
BOAT SPIKES
DOCK SPIKES
GUARD SPIKES
TRACK BOLTS

STEEL BARS IRON
DEFORMED REINFORCING

W. AMES & CO.

ESTABLISHED 1859
ROLLING MILL FACTORY — JERSEY CITY, N. J. — WAREHOUSE OFFICE

MACHINE BOLTS
TIE RODS
WASHERS
SPLICE BARS
RIVETS—NUTS

Conomatics and Cone Automatics

Are economical and accurate producers of screw machine parts up to 6" diameter, 7" milling length. They cut costs, increase production, boost profits.

Write for particulars

CONE AUTOMATIC MACHINE CO., Inc.
WINDSOR, VERMONT

REPRESENTATIVES:
Detroit: J. C. Austerberry's Sons, 332 Curtis Bldg., Detroit, Mich.
Chicago: John H. Glover, 2137 North Sayre Ave., Chicago, Ill.
Ohio: S. B. Martin, 1077 Erie Cliff Drive, Lakewood, Ohio.
New England: Potter & Johnston Machine Co., Pawtucket, R. I.
Indiana: G. A. Richey, Chamber of Commerce Bldg., Indianapolis, Ind.
New York State: Syracuse Supply Co., Syracuse, N. Y.; also Buffalo, N. Y.
Pennsylvania: Arch Machinery Co., 1029 Park Bldg., Pittsburgh, Pa.
California: C. F. Bulotti Machinery Co., 829-831 Folsom St., San Francisco, Calif. Eccles & Davis Machinery Co., Inc., 1910 Santa Fe Avenue, Los Angeles, California.
Arthur Jackson Machine Tool Company, 60 Front Street West., Toronto 2, Canada, and 437 Grosvenor Avenue, Westmount, Que.

GOSS and DE LEEUW

MULTIPLE SPINDLE
CHUCKING MACHINES
Two, Four, Five Spindles · Work and Tool Rotating Types
GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

17 STYLES AND SIZES

MERRELL

PIPE THREADING MACHINES (for BETTER threads)
TOLEDO, OHIO

LUCAS "PRECISION"

Horizontal Boring, Drilling and Milling Machine

THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

CLEVELAND, OHIO, U.S.A.

Cutting-off Machines

—for thin and thick wall steel tubing and bars

BARDONS & OLIVER
Cleveland, Ohio

We also manufacture a large line of turret machinery for finishing cast iron, steel and brass

Products Index

ABRASIVE WHEELS — See Grinding Wheels

ABRASIVE CLOTH & PAPER
Norton Co., Worchester, Mass.

ABRASIVES—Steel Shot and Grit
Pangborn Corporation, Hagerstown, Md.

ACCESSORIES—Welding
Lincoln Electric Co., The, Cleveland.

ACCUMULATORS—Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Hydraulik Gmbh. Duisburg, Germany.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Wood, R. D., & Co., Philadelphia.

ACETYLENE—Dissolved in Cylinders & Small Tanks
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

ACID-PROOF CEMENT
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

ACID-PROOF CONSTRUCTION
Atlas Mineral Prods. Co. of Pa., The, Mertztown, Pa.

ACIDS—Pickling
American Chemical Paint Co., Ambler, Pa.
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

AIR CONDITIONING EQUIPMENT
American Blower Corp., 6000 Russell St., Detroit

AIR TANKS AND CYLINDERS
Petroleum Iron Works Co., The, Sharon, Pa.
Scaife, William B., & Sons Co., Ptgh.

ALLOYS—Copper
American Brass Co., The, Waterbury, Conn.

ALLOYS—Ferro
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

ALLOYS—Magnesium
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ALLOYS—Phosphor Bronze
Phosphor Bronze Smelting Co., The, Phila.
Riverside (N. J.) Metal Co.

ALLOYS—Resistance Welding
Electrolay Co., Inc., 50 Church St., New York City.

ALLOYS—Titanium
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

ALLOYS—Tungsten
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

ALLOYS—Vanadium
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

ALLOYS—Zinc Base Die Casting
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ALUMINUM
Aluminum Co. of America, Pittsburgh.
Seligman, Arthur, & Co., Inc., 30 Rockefeller Plaza, R. C. A. Bldg., N. Y. C.

AMMETERS AND VOLTMETERS—Recording
Leeds & Northrup Co., Philadelphia.

AMMONIA RECOVERY PLANTS
Koppers Co., Pittsburgh.

ANGLES, BEAMS, CHANNELS AND TEES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.

ANGLES, BEAMS, CHANNELS & TEES —Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ANNEALING—See Heat Treating

ANNEALING BOXES
Lebanon (Pa.) Steel Foundry.
Petroleum Iron Works Co., The, Sharon, Pa.
United Engineering & Fdry. Co., Ptgh.

ANNEALING COVERS
Petroleum Iron Works Co., The, Sharon, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo.

ANODES—All Types
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Seymour (Conn.) Mfg. Co.
Udylite Co., The, Detroit.

ANODES—Cadmium
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Udylite Co., The, Detroit.

APPAREL—Welding
Lincoln Electric Co., The, Cleveland.

ARBORS
Cincinnati (Ohio) Milling Mch. Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ARMORING MACHINERY—Cable, Wire, Hose
Sleeper & Hartley, Inc., Worcester, Mass.

ARRESTERS—Spark
Harrington & King Perforating Co., Chicago.

ASBESTOS
Carey, Philip, Co., The, Cincinnati.

AXLES—Car or Locomotive
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

BALANCING EQUIPMENT
Cisholt Machine Co., Madison, Wis.

BALING PRESSES—Scrap — See Presses —Baling

BALLS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.

BALLS—Steel, Brass or Bronze
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BANDS—Steel
Acme Steel Co., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BANDS—Welded
Amer. Welding & Mfg. Co., Warren, O.

BARRELS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Ransohoff, N., Inc., Cincinnati.

BARRELS—Tumbling
Baird Mch. Co., The, Bridgeport, Conn.
Hartford (Conn.) Steel Ball Co., The.
Ransohoff, N., Inc., Cincinnati.
Whiting Corp., Harvey, Ill.

BARS—Alloy
Republic Steel Corp., Cleveland, Ohio.

BARS—Aluminum
Aluminum Co. of America, Pittsburgh.

BARS—Brass, Bronze or Copper
Bunting Brass & Bronze Co., Toledo, Ohio.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BARS—Cold Drawn
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.

BARS—Concrete, Reinforcing
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BARS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

BARS—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

BARS—Steel
Ames, W., & Co., Jersey City, N. J.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

BATTERIES—Storage
Electric Storage Battery Co., The, Phila.

BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.

BEAMS—See Angles, Beams, Channels and Tees

BEARINGS—Babbitt
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BEARINGS—Ball
Bantam Bearings Corp., The, South Bend, Indiana.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.

JUST BETWEEN US TWO

They Tell It to All the Pubs

IT used to be that when anyone criticized us our first and last reaction was, *"What the hell does he know about it?"* We would consider the critic's qualifications critically, and usually conclude he was just an ole fault-finder.

But when anyone praised us, we stamped him instantly as a man of rare discernment and an excellent judge of relative values. We never looked a bouquet-thrower in the teeth. But as we grow older we observe the existence of a stratum of chronic praise-givers. Often we have quoted a *"I-think-you're-wonderful"* letter, only to find a week or so later that we had been two-timed and that a competitor was flourishing an equally glowing letter from the same source.

Heartsick over this duplicity, we are turning for solace to the offhand, barely perceptible pats on the back that come to us indirectly in the daily mail. As, for instance, this one from W. L. Lapworth, works manager of the American Welding Co., Carbondale, Pa.:

> *"We have been subscribing to and receiving, with satisfaction, The Iron Age for several years. The writer personally has received every copy of The Iron Age for the past twenty-five years."*

Then there is that Wichita Falls manufacturer who begins, *"Your magazine is 'tops' in it's field,"* but that is hardly indirect enough, and besides his stenographer committed the sin of introducing an apostrophe into the possessive pronoun *its*, which always sends us into tantrums.

Decadent Decoding

A. W. MILLER says the "H.W.T.W.Y.W.H.X.M.M.R." that George R. Woods wrote on a postal to us is no puzzle at all and that it means, *"Hot weather, terrible weather, yawful weather, heat, xnow, mud, mire, rain."* Maybe he's right, but George R. himself just telephoned that he makes it out, *"Having wonderful time. Wish you were here. X marks my room."*

He Pats, Then Pounces

RELAPSING into sanity, the anonymous McC. makes the excellent suggestion that the headline on the NIAA ad (page 28 of Aug. 12 Iron Age) be adopted as an Iron Age slogan, *"Here's your chance to expose yourself to new ideas—new contacts."*

But, ashamed of himself for stepping out of character, he resumes his mordant role instantly with the acid comment: *"You presume to describe as literature a raft of run-of-mine advertising bulletins.* See page 123 of your Aug. 12 issue." If McC. refuses to recognize as literature any document that points the way to industrial savings or product improvement a flash coat of chromium plate is broader than his mind.

Or at the Most a No. 7 Shot

McC.'S persistent heckling drives us crazy and we would say as much if we were not afraid that he read somewhere, as we did, the pat answer, *"That's not a drive. It's a putt."*

Cerebral Dept.

FRED W. (WESTINGHOUSE AIR BRAKE) PENNINGTON, one of those who solved the match problem (Aug. 12, p. 137) at a glance—well, a long glance—implies that we could have stated the problem more lucidly. We spoke of *"replacing two of the matches."* Fred says we should have said *"re-placing,"* meaning picking up two of the matches and putting them down somewhere else.

Anyway, here's the answer. The dotted line shows where two of the matches were before they were picked up and put in the positions indicated by dashes, converting the five squares into four:

—A. H. D.

LELAND-GIFFORD COMPANY
Worcester, Mass.
Drilling Machinery
Belt and Motor Spindle
One to Six Spindles
Tapping Attachments and Multiple Heads

Products Index

BEARINGS, Brass and Bronze
Ampco Metal, Inc., Milwaukee Wis.
Bunting Brass & Bronze Co. Toledo, O
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Lawrenceville Bronze Co., Pittsburgh.
National Bearing Metals Corp., Pittsburgh.

BEARINGS—Oilless
Bunting Brass & Bronze Co., Toledo, O.
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.
Richardson Co., The, Melrose Park, Ill.

BEARINGS—Quill
Bantam Bearings Corp., The, South Bend, Indiana.

BEARINGS—Radial
Bantam Bearings Corp., The, South Bend, Indiana.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.

BEARINGS—Roll Neck
Bantam Bearings Corp., The, South Bend, Indiana.
Morgan Construction Co., Worcester, Mass.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller
Bantam Bearings Corp., The, South Bend, Indiana.
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.
Standard Machinery Co., Providence, R. I.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller Tapered
Bantam Bearings Corp., The, South Bend, Indiana.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Rolling Mill Equipment
Bantam Bearings Corp., The, South Bend, Indiana.
Richardson Co., The, Melrose Park, Ill.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Self-aligning Roller
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.

BEARINGS—Shaft Hanger
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.

BEARINGS—Thrust
Bantam Bearings Corp., The, South Bend, Indiana.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.
Timken Roller Bearing Co., The, Canton, O.

BELT DRESSING
Rhoads, J. E., & Sons, Philadelphia.

BELT LACING
Rhoads, J. E., & Sons, Philadelphia.

BELT—Conveyor, Elevator
Goodrich, B. F. Co., The, Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

BELTING CEMENT
Rhoads, J. E., & Sons, Philadelphia.

BELTING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Rhoads, J. E., & Sons, Philadelphia.

BELTING—Metal, Conveyor, High and Low Temperature
Acme Steel Co., Chicago, Ill.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

BELTING—Rubber
Goodrich, B. F. Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Robins Conveying Belt Co., 15 Park Row, N. Y. C.

BELTS—V-Type
Allis-Chalmers Mfg. Co., Milwaukee.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

BENDING MACHINES—Hand, Band and Angle
Excelsior Tool & Mch. Co., E. St. Louis, Ill.

BENDING MACHINES—Hand and Power
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Kane & Roach, Inc., Syracuse, New York.
Niagara Machine & Tool Works, Buffalo, N. Y.

BENZOL RECOVERY PLANTS
Koppers Co., Pittsburgh.

BERYLLIUM COPPER
American Brass Co., The, Waterbury, Conn.
Riverside (N. J.) Metal Co.

BILLETS—Alloy Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Carbon Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Carbon Vanadium Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Nickel Steel
Andrews Steel Co., The, Newport, Ky.
Rustless Iron & Steel Corp., Baltimore, Md.

BILLETS—Chrome Steel
Andrews Steel Co., The, Newport, Ky.
Rustless Iron & Steel Corp., Baltimore, Md.

BILLETS—Die Block Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Forging
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Cleveland, Ohio.

BILLETS—Nickel Steel
Andrews Steel Co., The, Newport, Ky.

BILLETS—Re-rolling
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.

BILLETS—Steel
Bethelhem (Pa.) Steel Company.
Continental Steel Corp., Kokomo, Ind.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BIMETAL—Thermostatic
Chace, W. M., Co., 1605 Beard Ave., Detroit.

BINS—Rotating
Frick-Gallagher Mfg. Co., The, Wellston, Ohio.

BLANKS—Chisel
Cleveland Steel Tool Co., The, 660 E. 82nd St., Cleveland, Ohio.

BLANKS—Gear and Pinion
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Richardson Co., The, Melrose Park, Ill.

BLANKS—Gear, Silent Steel
Waldron, John, Corp., New Brunswick, N. J.

BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.

BLAST FURNACES
Brassert, H. A., & Co., Chicago, Ill.

BLAST GATES
Rockwell, W. S., Co., 50 Church St., N.Y.C.

BLOCKS—Chain
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

BLOWERS
American Air Filter Co., Inc., Louisville, Ky.
American Blower Corp., 6000 Russell St., Detroit.
North American Mfg. Co., The, Cleveland.
Spencer Turbine Co., Hartford, Conn.

BLOWPIPES—Oxy-Acetylene Welding & Cutting
Linde Air Prods. Co., The, 30 E. 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit.

BLOWPIPES—Soldering, Heating, Annealing
American Gas Furnace Co., Elizabeth, N.J.
Torit Mfg. Co., St. Paul, Minn.
Weldit Acetylene Co., Detroit.

BOILERS
Munroe R., & Sons Mfg. Corp., Pittsburgh.

BOILERS—Waste Heat
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOILERS—Water Tube
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOLT CUTTERS
Landis Mch. Co., Inc., Waynesboro, Pa.

BOLT AND NUT MACHINERY
Ajax Mfg. Co., The, Euclid, Ohio.
Landis Machine Co., Inc., Waynesboro, Pa.
Manville, E. J., Mch. Co., Waterbury, Ct.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

BOLT & RIVET CLIPPERS
Bremil Mfg Co., Erie, Pa.
Helwig Mfg. Co., St. Paul, Minn.

BOLTS—Carriage and Machine
Cleveland (Ohio) Cap Screw Co., The
Erie (Pa.) Bolt & Nut Co.
Lamson & Sessions Co., The, Cleveland.
Oliver Iron & Steel Corp., Pittsburgh.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Special
Erie (Pa.) Bolt & Nut Co.
Lamson & Sessions Co., The, Cleveland.
Oliver Iron & Steel Corp., Pittsburgh.
Republic Steel Corp., Upson Nub Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Special, Hot or Cold Upset
Lamson & Sessions Co., The, Cleveland.
Oliver Iron & Steel Corp., Pittsburgh.

BOLTS—Stove
Blake & Johnson Co., The, Waterville, Ct.
Lamson & Sessions Co., The, Cleveland.

BOLTS—Track
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Lamson & Sessions Co., The, Cleveland.
Republic Steel Corp., Upson Nut Div., Cleveland, O.

BOLTS AND NUTS
Ames, W., & Co., Jersey City, N. J.
Clark Bros. Bolt Co., Millidgle, Conn.
Erie (Pa.) Bolt & Nut Co.
Heiz & Heiz, Inc., 33—34th St., Brooklyn, N. Y.
Lamson & Sessions Co., The, Cleveland.
Oliver Iron & Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOND—Grinding Wheel
Bakelite Corp., 247 Park Ave., N. Y. C.

BOOTHS—Spray
DeVilbiss Co., The, Toledo, Ohio.

BORING BARS
Bullard Co., The, Bridgeport, Conn.

BORING, DRILLING & MILLING MACHINES—Horizontal
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
Lucas Machine Tool Co., Cleveland.
National Automatic Tool Co., Richmond Ind.

BORING & DRILLING MACHINES—Vertical
Baker Bros., Inc., Toledo, Ohio.
Bullard Co., The, Bridgeport, Conn.

BORING MACHINES—Diamond
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

BORING MACHINES—Diamond & Carbide Tools
Heald Mch. Co., Worcester, Mass.

BORING MACHINES—Jig
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

BORING & TURNING MILLS—Vertical
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Planer Co.
Rogers Machine Wks., Alfred, New York.

BOX STRAPPING
Acme Steel Co., Chicago, Ill.

BRAKE LINING AND BLOCKS—Asbestos
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

BRAKES—Electric
Cutler-Hammer, Inc., Milwaukee.

BRAKES—Electric & Mechanical
Clark Controller Co., The, Cleveland.
Electric Controller & Mfg. Co., The, Cleveland.

BRAKES—Magnetic
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

BRAKES—Metal Forming
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Steelweld Machinery Co., Cleveland.

BRICK—Fire Clay
Carborundum Co., The, Niagara Falls, N. Y.
Illinois Clay Products Co., Joliet, Ill.
Quigley Co., Inc., 56 West 45th St., N. Y. C.

BRICK—Insulating
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BRIDGE BUILDERS
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Belmont Iron Works, Philadelphia.

BRIDGE OPERATING MACHINERY—Movable
Earle Gear & Mch. Co., Philadelphia.

BRIQUETS—Ferroalloy
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

BROACHING MACHINES
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Milling Mch. Co., The.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

BRONZE FOR DIES
Ampco Metal, Inc., Milwaukee, Wis.

BRONZE—Phosphor
Bunting Brass & Bronze Co., Toledo, Ohio.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

BRUSHES—Machine
Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

BRUSHES—Wire
Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

BUCKETS—Clamshell
Blaw-Knox Co., Pittsburgh.
Hayward Co., The, 50 Church St., N. Y. C.
Industrial Brownhoist Corp., Bay City, Mich.

BUCKETS—Electric Motor
Hayward Co., The, 50 Church St., N. Y. C.

BUCKETS—Elevator
Jeffrey Mfg. Co., The, Columbus, Ohio.

BUCKETS—Orange Peel
Hayward Co., The, 50 Church St., N. Y. C.

BUFFERS & POLISHING MACHINES
Packer Machine Co., The, Meriden, Conn.
Vonnegut Moulder Corp., 1807 Madison Ave., Indianapolis, Ind.

BUFFING APPLICATORS—Automatic
Packer Machine Co., The, Meriden, Conn.

BUILDINGS—Factory
Ferguson, H. K., Co., The, Cleveland.

BUILDINGS—Steel
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Belmont Iron Works, Philadelphia.
Bethlehem (Pa.) Steel Co.
Blaw-Knox Co., Pittsburgh.
Ferguson, H. K., Co., The, Cleveland.
Iron & Steel Products, Inc., Chicago.

BULLDOZERS
Ajax Mfg. Co., The, Euclid, Ohio.
Beatty Mch. & Mfg. Co., 936—150th St., Hammond, Ind.
Steelweld Machinery Co., Cleveland.

BULLDOZERS—Hydraulic
Elmes, Chas. P., Engng. Wks., Chicago.

BURNERS—Oil or Gas
North American Mfg. Co., The, Cleveland.

BUSHINGS—Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Lawrenceville Bronze Co., Pittsburgh.
Phosphor Bronze Smelting Co., The, Phila.
Shenango-Penn Mold Co., Pittsburgh.

BUSHINGS—Oilless
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BUSHINGS—Phosphor Bronze
Bunting Brass & Bronze Co., Toledo, Ohio.
Phosphor Bronze Smelting Co., The, Phila.

BY-PRODUCTS COKE AND GAS OVENS
Koppers Co., Pittsburgh.

CABINETS—Stock
Frick-Gallagher Mfg. Co., The, Wellston, Ohio.

CABLE—Electric
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., The, Cleveland.
Simplex Wire & Cable Co., Cambridge A, Boston, Mass.

CABLEWAYS AND TRAMWAYS—See Tramways

CADMIUM
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Udylite Co., The, Detroit.

CADMIUM PLATING PROCESS
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Udylite Co., The, Detroit.

CALCIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CALCULATING MACHINES
Monroe Calculating Machine Co., Inc., Orange, N. J.

CARBIC
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

CARBIDE
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

CARBIDE—Boron
Norton Co., Worcester, Mass.

CARBURIZING—See Heat Treating

CARS—Railway
Iron & Steel Products, Inc., Chicago.

CARS—Industrial and Mining
Atlas Car & Mfg. Co., The, Cleveland.
Bartlett, C. O.-Snow Co., The, Cleveland.

CASE HARDENING—See Heat Treating

CASTINGS—Acid or Heat Resisting
Ampco Metal, Inc., Milwaukee, Wis.
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.
Hoskins Mfg. Co., Detroit, Mich.
Lebanon (Pa.) Steel Foundry.
Midvale Co., The, Nicetown, Phila., Pa.
Meehanite Metal Corp., Pittsburgh.

CASTINGS—Alloy Iron
Forging & Casting Corp., The, Ferndale, Mich.
Weatherly (Pa.) Foundry & Mfg. Co.

CASTINGS—Alloy Steel
Bissett Steel Co., The, Cleveland.
Dodge Steel Co., Philadelphia, Pa.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.

Products Index

CASTINGS—Aluminum
Aluminum Co. of America, Pittsburgh.

CASTINGS—Brass, Bronze, Copper or Aluminum
Cadman, A. W., Mfg. Co., Pittsburgh.
Carbon Malleable Casting Co., Inc., Lancaster, Pa.
Lawrenceville Bronze Co., Pittsburgh.
National Bearing Metals Corp., Pittsburgh.
Phosphor Bronze Smelting Co., The, Phila.
Snyder, W. P., & Co., Pittsburgh.
Spencer's, I. S., Sons, Inc., Guilford, Ct.

CASTINGS—Corrosion Resisting
Meehanite Metal Corp., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.

CASTINGS—Die, Aluminum
Aluminum Co. of America, Pittsburgh.

CASTINGS—Electric Steel
Dodge Steel Co., Philadelphia, Pa.
Industrial Steel Casting Co., The, Toledo.
Lebanon (Pa.) Steel Foundry.

CASTINGS—Gray Iron
American Engineering Co., Philadelphia.
Cheney, S., & Son, Manlius, N. Y.
Midvale Co., The, Nicetown, Phila., Pa.
Murray Iron Wks. Co., Burlington, Iowa.
National Roll & Fdry. Co., Avonmore, Pa.
North Wales (Pa.) Mach. Co., Inc.
Spencer's, I. S., Sons, Inc., Guilford, Ct.

CASTINGS—High Test & Alloy Iron
Meehanite Metal Corp., Pittsburgh.

CASTINGS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

CASTINGS—Malleable
Baltimore (Md.) Malleable Iron & Steel Casting Co.
Carbon Malleable Casting Co., Inc., Lancaster, Pa.
Lake City Malleable Co., The, 5100 Lakeside Ave., Cleveland.
Malleable Iron Fittings Co., Branford, Ct.
Peoria (Ill.) Malleable Castings Co.

CASTINGS—Meehanite Metal
Meehanite Metal Corp., Pittsburgh.

CASTINGS—Monel & Nickel
Superior Bronze Corp., Erie, Pa.

CASTINGS—Semi-Steel
Malleable Iron Fittings Co., Branford, Ct.

CASTINGS—Steel
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Crucible Steel Castings Co., Lansdowne, Pa.
Dodge Steel Co., Philadelphia, Pa.
Industrial Steel Castings Co., The, Toledo.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh.
Malleable Iron Fittings Co., Branford, Ct.
Mesta Mch. Co., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.
Standard Steel Wks. Co., Burnham, Pa.

CASTINGS—Wear Resisting
Meehanite Metal Corp., Pittsburgh.

CEMENT—Acid-Proof
Atlas Mineral Products Co. of Pa., The, Mertztown, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CEMENT—Quick Setting, Acid Proof & Insulating
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

CEMENT—Refractory
Carborundum Co., The, Perth Amboy, N. J.
Johns-Manville Corp., 22 East 40th St., New York City.
Quigley Co., Inc., 56 West 45th St., N. Y. C.

CEMENT—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.

CHAINS—Conveyor & Elevator
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Bartlett, C. O.-Snow Co., The, Cleveland.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jeffrey Mfg. Co., The, Columbus, Ohio.

CHAINS—Power Transmission
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Boston Gear Works, Inc., North Quincy, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Roller
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Bartlett, C. O.-Snow Co., The, Cleveland.
Diamond Chain & Mfg. Co. Indianapolis, Ind.
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Silent
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHANNELS—See Angles, Beams, Channels and Tees

CHECKS—Metal
Cunningham, M. E., Co., Pittsburgh.
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

CHEMICALS—Industrial
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CHEMICALS—Rust Proofing
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
Udylite Co., The, Detroit.

CHROMIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CHUCKING MACHINES—Multiple Spindle
Baird Mch. Co., The, Bridgeport, Conn.
Goss & DeLeeuw Machine Co., New Britain, Conn.
National Acme Co., The, Cleveland.

CHUCKS—Air Operated
Hannifin Mfg. Co., Chicago.

CHUCKS—Drill
Cleveland (Ohio) Twist Drill Co., The.
Morse Twist Drill & Mach. Co., New Bedford, Mass.

CHUCKS—Magnetic
Heald Mch. Co., Worcester, Mass.
Taft-Peirce Mfg. Co., The, Woonsocket, R.I.

CIRCLES—Phosphor Bronze
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Riverside (N. J.) Metal Co.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Detroit Rex Products Co., Detroit, Mich.
Ford, J. B., Co., The, Wyandotte, Mich.
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.
Pennsylvania Salt Mfg. Co., Phila., Pa.

CLEANING COMPOUNDS—Alkali
Detroit Rex Products Co., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CLEANING EQUIPMENT—Metal
Detroit Rex Products Co., Detroit, Mich.

CLEANING EQUIPMENT (Metal)—Electro-Chemical
Bullard Co., The, Bridgeport, Conn.

CLEANING MATERIALS—Glass
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

CLUTCH-BRAKES—Magnetic
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

CLUTCHES
Fairbanks, Morse & Co., Chicago.
Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Medart Co., The, St. Louis, Mo.
Morse Chain Co., Ithaca, New York.

CLUTCHES—Magnetic
Cutler-Hammer, Inc., Milwaukee.
Dings Magnetic Separator Co., Milwaukee.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

COAL
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Hanna Furnace Corp., The, Detroit, Mich.
Koppers Coal Co., Inc., The, Pittsburgh.
Pickands Mather & Co., Cleveland.

COAL, ORE AND ASH HANDLING MACHINERY
Bartlett, C. O.-Snow Co., The, Cleveland.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Robins Conveying Belt Co., 15 Park Row, N. Y. C.

COBALT METAL
Central Trading Corp., 511 Fifth Ave., N. Y. C.

COILS—Pipe
Harrisburg (Pa.) Steel Corp.

COKE—Metallurgical
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Pickands Mather & Co., Cleveland.

COKE OVEN MACHINERY
Atlas Car & Mfg. Co., The, Cleveland.
Koppers Co., Pittsburgh.

COKE OVENS—By-Products
Koppers Co., Pittsburgh.

COKE OVENS—Cross Regenerators
Koppers Co., Pittsburgh.

COKE OVENS—With Recovery of By-Products
Koppers Co., Pittsburgh.

COLLETS
Rivett Lathe & Grinder, Inc., Boston, Mass.

COLUMBIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

COMBUSTION CONTROLS
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia.
Morgan Construction Co., Worcester, Mass.
North American Mfg. Co., The, Cleveland.

Cutting Off Machines for Sawing All Kinds of Metals

THE ESPEN-LUCAS MACHINE WORKS
FRONT AND GIRARD AVE., PHILADELPHIA, PENNA.

Grinding
Polishing
Sanding
Drilling
Reaming

Strand

Nut Setting
Screw Driving
Rotary Filing
Stainless Steel
Weld Finishing

Flexible Shafts and Machines
Vertical and Horizontal Types—⅛ to 2 H.P.
Send for General Catalog

N. A. STRAND & CO.
5001 No. Lincoln St. Chicago

THE CLEVELAND STEEL TOOL CO.
Punches. Dies. Chisels. Rivet Sets
660 E. 82nd St. Cleveland, O.
If it's RIVETED you KNOW it's safe

Famous for quality of threads they produce, long life of chasers and all-around dependability.

Following literature available:
Bulletin on H & G General Purpose Die Heads.
Bulletin on new Insert Chaser Type of Die Head.
Bulletin on H & G Threading Machines.
See our Advt., page 220, April Machinery.

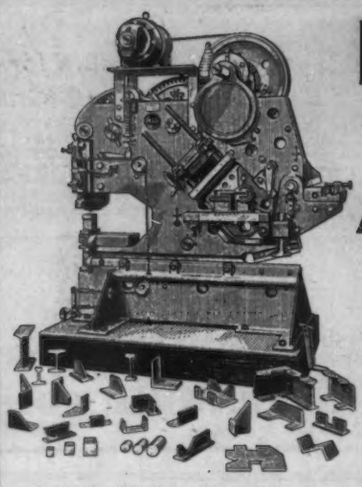
The Eastern Machine Screw Corp.
21-41 Barclay Street, New Haven, Conn.
Los Angeles: A. C. Behringer, 312 Commercial St., Los Angeles, Cal. San Francisco: Guy Reynolds, 464 Vernon St., Oakland, California.

Die Heads

Engineered Springs
whose production is carefully thought through from every angle—
DESIGN — MATERIAL
MANUFACTURE and DELIVERY

TRY GIBSON'S SPEEDY SMALL ORDER DEPT.
FOR SPRINGS, WIRE FORMS, STAMPINGS

WM. D. GIBSON COMPANY
DIVISION OF ASSOCIATED SPRING CORPORATION
1800 CLYBOURN AVE. • CHICAGO, ILL.



PELS

COMBINATION PUNCH PLATE SHEAR ANGLE, BAR and TEE CUTTER *with* BUILT-IN NOTCHER and COPER

A complete fabricating shop in one small unit.

Indispensable for structural, architectural, ornamental iron and sheet metal work, and general maintenance and repair work of industrial plants.

CUTS Plates of any length and width
Flats
Rounds and Squares
Angles and Tees square and on mitre
Perfect cuts obtained

PUNCHES Plates and Structural Shapes in webs and flanges
Full Floating Punch Head

COPES and **NOTCHES** Angles, etc.

GUARANTEED UNBREAKABLE STEEL PLATE FRAME

Built in Eight Sizes

HENRY PELS & CO., Inc.

90 West Street — New York, N. Y.

Shearing SHEET METAL *the* 1937 WAY

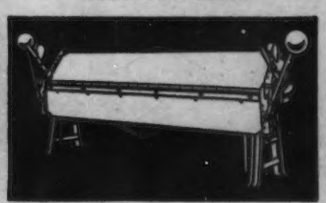
A new sheet metal shear for light gauge steel (10 ga. and lighter) that presents some outstanding new features which make for economy and perfect operation. A few are: No flywheel, no clutch, no treadle, no counterweights, no motor idling, no frame deflection, are welded. There are many other points of superiority. Write for Bulletin!

Beatty also builds punching and shearing machines, vertical bulldozers, coping machines, spacing tables, and the Hammond Reverslip Portable Floor Crane.

BEATTY MACHINE & MFG. CO., 936-150TH STREET HAMMOND, IND.

CHICAGO

BUILT OF STEEL



BRAKES, PRESSES AND SHEARS

DREIS & KRUMP MFG. CO.

7430 LOOMIS BLVD. — CHICAGO, ILL.

Products Index

COMPOUNDS—Drawing
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

COMPRESSORS—Air
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Fairbanks, Morse & Co., Chicago.
Hobart Bros., Troy, Ohio.
Ingersoll-Rand Co., 11 Broadway, New York City.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Spencer Turbine Co., Hartford, Conn.
Sullivan Machinery Co., Michigan City, Ind.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.
Worthington Pump & Machinery Corp., Harrison, N. J.

COMPRESSORS—Gas
Sullivan Machinery Co., Michigan City, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

COMPRESSORS—Rebuilt. (See Clearing House Section)

CONCRETE CONSTRUCTION
Ferguson, H. K., Co., The, Cleveland.

CONDENSERS—Surface & Jet
Ingersoll-Rand Co., 11 Broadway, N.Y.C.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONTRACTORS' SUPPLIES — Second-Hand. (See Clearing House Section)

CONTROL SYSTEMS—Temperature
Leeds & Northrup Co., Philadelphia.

CONTROLLERS—Crane
Cutler-Hammer, Inc., Milwaukee.

CONTROLLERS—Electric
Clark Controller Co., The, Cleveland.
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.
General Electric Co., Schenectady, N. Y.

CONTROLLERS—Valve, Electrically Operated
Brown Instrument Co., The, Philadelphia, Pa.
Cutler-Hammer, Inc., Milwaukee.
Leeds & Northrup Co., Philadelphia.

CONVEYING AND ELEVATING MACHINERY
Bartlett, C. O.-Snow Co., The, Cleveland.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link-Belt Co., Chicago.
Logan Co., Inc., Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
Robins Conveying Belt Co., 15 Park Row, N. Y. C.

CONVEYOR WORMS
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.

CONVEYORS—Flexible Wire Belt
Audubon Wire Cloth Corp., Phila., Pa.

CONVEYORS—Gravity
Logan Co., Inc., Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.

CONVEYORS—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

CONVEYORS—Portable
Jeffrey Mfg. Co., The, Columbus, Ohio.
Robins Conveying Belt Co., 15 Park Row, N. Y. C.

COPING MACHINES
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

CORE OIL
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

CORUNDUM WHEELS — See Grinding Wheels

COTTERS AND KEYS—Spring
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.
Western Wire Prods. Co., St. Louis, Mo.

COUNTERBORES
Cleveland (Ohio) Twist Drill Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

COUNTERS—Production
Durant Mfg. Co., Milwaukee, Wis.
Veeder-Root, Inc., Hartford, Ct.

COUNTERS—Revolution, Recording
Durant Mfg. Co., Milwaukee, Wis.

COUNTING MACHINES
Veeder-Root, Inc., Hartford, Conn.

COUPLINGS—Air Hose
Cleveland (Ohio) Pneumatic Tool Co., The.

COUPLINGS—Cut-off Friction
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.

COUPLINGS—Flexible
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., Chicago.
Morse Chain Co., Ithaca, New York.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS—Pipe
Harrisburg (Pa.) Steel Corp.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

CRANES—Crawling Tractor
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., The, Bucyrus, Ohio.

CRANES — Electric, Industrial, Truck Mounted
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.

CRANES—Electric Traveling
Armel, James P., Pittsburgh.
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Conco Engineering Works, Mendota, Ill.
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Electric Hoist & Motor Co., 149 N. 9th St., Bklyn., N. Y.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, Detroit, Mich.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.

CRANES—Gantry
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Morgan Engineering Co., The, Alliance, O.
Whiting Corp., Harvey, Ill.

CRANES—Hand Power
American Monorail Co., The, Cleveland.
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Conco Engineering Works, Mendota, Ill.
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

CRANES—Jib
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of the Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Conco Engineering Works, Mendota, Ill.
Euclid Crane & Hoist Co., The, Euclid, O.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Whiting Corp., Harvey, Ill.

CRANES—Locomotive
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., The, Bucyrus, O.

CRANES—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES—Portable
Canton Fdry. & Mch. Co., Cleveland.

CRANES—Portable Electric
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.

CRANKSHAFTS
Union Drawn Steel Co., Massillon, Ohio.

CRANKSHAFTS—Forged
Bay City Forge Co., Erie, Pa.

CRUSHERS—Coal
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.
Jeffrey Mfg. Co., The, Columbus, Ohio.

CRUSHERS—Steel Turning
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.

CUTTERS—Die Sinking
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Tomkins-Johnson Co., The, Jackson, Mich.

Products Index

CUTTERS—Keyseating
Davis Keyseater Co., 100 Exchange St., Rochester, N. Y.

CUTTERS—Milling
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland (Ohio) Twist Drill Co., The.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

CUTTING-OFF MACHINES—Abrasives
Tabor Mfg. Co., Phila.

CUTTING-OFF MACHINES—Cold Saw
Espen-Lucas Mch. Wks., Philadelphia.
Heller Machine Co., 114 Liberty St., N. Y. C.

CUTTING-OFF MACHINES—Pipe or Tubing
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Bardons & Oliver, Cleveland.
Etna Machine Co., The, Toledo, Ohio.
Landis Mch. Co., Inc., Waynesboro, Pa.

CUTTING AND WELDING APPARATUS—Oxy-Acetylene—See Welding and Cutting Machines and Equipment—Oxy-Acetylene.

CYLINDERS — Compressed Air & Hydraulic
Tomkins-Johnson Co., The, Jackson, Mich.

CYLINDERS—Seamless
Harrisburg (Pa.) Steel Corp.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

DEGREASING COMPOUNDS
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

DEGREASING MACHINES—Solvent
Detroit Rex Products Co., Detroit, Mich.

DEOXIDIZERS
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

DICTATING MACHINES
Dictaphone Sales Corp., 420 Lexington Ave., New York City.

DIE BLOCKS—Drop Hammer
Heppenstall Co., Pittsburgh.

DIE-FILING MACHINES
Continental Machine Specialties, Inc., Minneapolis, Minn.

DIE SINKING MACHINES — Automatic and Hand
Cincinnati (Ohio) Milling Mch. Co., The.
Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn.

DIEING MACHINES—Automatic
Henry & Wright Mfg. Co., The, Hartford, Conn.

DIES—Cast Tool Steel
Forging & Casting Corp., The, Ferndale, Mich.

DIES, JIGS, FIXTURES, etc.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

DIES—Pipe Threading
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.

DIES—Screw and Thread Cutting
Eastern Mach. Screw Corp., New Haven, Ct.
Greenfield (Mass.) Tap & Die Corp.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.

DIES—Self-Opening Adjustable
Eastern Mach. Screw Corp., New Haven, Ct.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.
National Acme Co., The, Cleveland.

DIES—Sheet Metal Working
Bliss, E. W., Co., Toledo, Ohio.
Worcester (Mass.) Stamped Metal Co.

DIES—Steel Letters and Stamps
Cunningham, M. E., Co., Pittsburgh.
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

DOORS & SHUTTERS, Fireproof
Kinnear Mfg. Co., Columbus, Ohio.

DOORS & SHUTTERS—Steel or Wood Rolling
Kinnear Mfg. Co., Columbus, Ohio.

DRAWN WORK—Metal—See Stampings or Drawings—Metal

DRILL HEADS—Hydraulic
National Automatic Tool Co., Richmond, Ind.

DRILL HEADS—Multiple
Baker Bros., Inc., Toledo, Ohio.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

DRILLING MACHINES—Bench
Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Heavy Duty
Baker Bros., Inc., Toledo, Ohio.

DRILLING MACHINES—Multiple Spindle
Baker Bros., Inc., Toledo, Ohio.
Henry & Wright Mfg. Co., The, Hartford, Conn.
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES—Multiple Spindle Adjustable
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES—Multiple Spindle Horizontal
Baker Bros., Inc., Toledo, Ohio.
National Automatic Tool Co., Richmond, Ind.

DRILLING MACHINES—Portable Electric
Wodack Electric Tool Corp., Chicago.

DRILLING MACHINES—Portable Pneumatic
Cleveland (Ohio) Pneumatic Tool Co., The.
Helwig Mfg. Co., St. Paul, Minn.
Ingersoll-Rand Co., 11 Broadway, New York City.
Warner & Swasey Co., The, Cleveland.

DRILLING MACHINES—Radial
Cincinnati (Ohio) Bickford Tool Co., The.

DRILLING MACHINES—Rock
Ingersoll-Rand Co., 11 Broadway, New York City.

DRILLING MACHINES—Sensitive
Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Upright
Baker Bros., Inc., Toledo, Ohio.
Cincinnati (Ohio) Bickford Tool Co., The.
Cleereman Machine Tool Co., Green Bay, Wis.

DRILLING MACHINES—Vertical
Baker Bros., Inc., Toledo, Ohio.
Cincinnati (Ohio) Bickford Tool Co., The.
Cleereman Machine Tool Co., Green Bay, Wis.

DRIVES—Gear
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Mesta Mch. Co., Pittsburgh.

DRIVES—Single & Multiple V-Belts
Allis Chalmers Mfg. Co., Milwaukee.

DROP FORGINGS—See Forgings—Drop, Iron or Steel

DROP HAMMERS—See Hammers—Drop

DUST COLLECTORS
Abrasive Machine Tool Co., East Providence, R. I.
American Air Filter Co., Inc., Louisville, Ky.
American Blower Corp., 6000 Russell St., Detroit.
American Foundry Equipment Co., The, 401 Bykrit St., Mishawaka, Ind.
Blaw-Knox Co., Pittsburgh.
Pangborn Corporation, Hagerstown, Md.
Whiting Corp., Harvey, Ill.

ECONOMIZERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

ELECTRIC HEATING ELEMENTS
Globar Div., The Carborundum Co., Niagara Falls, N. Y.

ELECTRIC LIGHTING
General Electric Co., Cleveland.
General Electric Vapor Lamp Co., Hoboken, N. J.

ELECTRIC WELDING — See Welding — Electric

ELECTRICAL EQUIPMENT
Allis-Chalmers Mfg. Co., Milwaukee.
General Electric Co., Schenectady, N. Y.

ELECTRICAL MACHINERY — Second Hand. (See Clearing House Section)

ELECTRICAL WIRES
Roebling's, John A., Sons Co., Trenton, N. J.

ELECTRODE HOLDERS—Welding
Lincoln Electric Co., The, Cleveland.

ELECTRODES—Resistance Welding
Electroloy Co., Inc., 50 Church St., New York City.

ELECTRODES—Welding, Coated
Electric Arc Cutting & Welding Co., The, Newark, N. J.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., The, Cleveland.
Maurath, Inc., 7400 Union Ave., Cleveland.
Una Welding, Inc., Cleveland, Ohio.

ELECTROPLATING EQUIPMENT & SUPPLIES
Udylite Co., The, Detroit.

ELEVATORS—Portable
Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.

ELEVATORS—Steam Hydraulic
Ridgway, Craig, & Son Co., Coatesville, Pa.

EMERY WHEELS—See Grinding Wheels

ENAMEL
Sherwin-Williams Co., Cleveland.

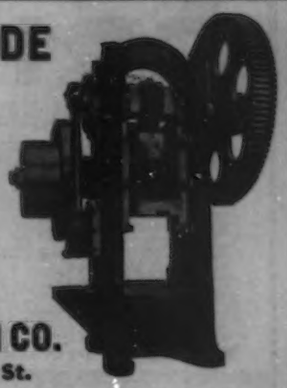
ENGINEERS & CONTRACTORS
Ferguson, H. K., Co., The, Cleveland.

ENGINEERS—Consulting and Industrial
Koppers Co., Pittsburgh.

ENGINES—Diesel
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES—Gas
Fairbanks, Morse & Co., Chicago.
Worthington Pump & Machinery Corp., Harrison, N. J.

STRAIGHT SIDE PRESSES



The complete line of efficient Zeh & Hahnemann presses includes straight side presses, either single or double crank, for heavy blanking and forming operations. These are made with either a solid frame or a frame built up with the rods as illustrated. Ask for the Z & H catalog of modern presses.

ZEH & HAHNEMANN CO.
Avenue A & Vanderpool St.
NEWARK, N. J.

PRESSES
FEEDS
AUTOMATIC EQUIPMENT
THE V & O Press Co.
HUDSON N Y

STAINLESS 18-8 LARGE STOCKS
PIPE
TUBING
FITTINGS
THE CLEVELAND TOOL & SUPPLY CO.
1427-1437 W. Sixth Street CLEVELAND, OHIO

CARBON TOOL STEELS
ALSO
HIGH SPEED STAINLESS and SPECIAL ALLOY STEELS
LATROBE ELECTRIC STEEL CO.
LATROBE, PA.

***High Grade* STRIP STEEL**
Stamping and Deep Drawing—Uniform in Quality
Control of the quality begins with the manufacture of the steel in our own Open Hearth and continues through all subsequent processes.
LACLEDE STEEL CO., ST. LOUIS
STEEL WORKS & ROLLING MILLS, ALTON and MADISON, ILL.
OFFICES: Detroit—Chicago—St. Louis—Kansas City

WETHERELL BROS. STEEL CO. 1879
WETHERELL BROS. CO.
251 Albany St., Cambridge, Mass.
C. R. Strip
Tool Steel
Stainless Steel
O H Specialties

STANLEY STEEL
STEEL MAKERS SINCE 1871
BILLETS - SLABS - STRIP STEEL
THE STANLEY WORKS
NEW BRITAIN, CONN. - BRIDGEPORT, CONN. - HAMILTON, ONTARIO

GRIFFIN

COLD ROLLED
STRIP
STEEL

½" to 19" wide.
.002" to .500" thick
Desired Quality for Forming and Drawing

SALES AGENTS
NEW YORK CITY — Wm. H. Leonori & Co., Inc., 30 Howard St.
PHILADELPHIA—C. B. Tippett, 4308 North Broad St.
CHICAGO—Central Steel & Wire Co., 4545 South Western Blvd.
DETROIT—E. R. Wegener, 514 Stephenson Bldg.
CLEVELAND—Paterson-Leitch Co., 900 East 69th St.
BUFFALO—J. J. Lambert, 323 Huntington Ave.
DAYTON—Central Steel & Wire Co., 1095 East Monument Ave.
SAN FRANCISCO — Charles L. Lewis, 708 Market St.

GRIFFIN MFG. CO. ERIE, PENNA.

RYERSON ~ STEEL

Immediate shipment of all steel and allied products including bars, structurals, sheets, plates, tubing, alloy and tool steel, Allegheny stainless, babbitt, boiler tubes and fittings, welding rod and equipment, metal working tools, etc. Write for the Ryerson Stock List

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

HOLLOW BORED SPINDLES

Machine tools must have good spindles. That is why leading machine tool builders use American Hollow Bored products. Write for prices on American Hollow Bored spindles, shafts, rams and hydraulic cylinders.

AMERICAN HOLLOW BORING CO.
1912 RASPBERRY ST. ERIE, PA.

STEEL FORGINGS

UPSET, DROP and COIN PRESSED
ANY ANALYSIS—ANY QUANTITY

Send us your blue prints for prices

ROCKFORD DROP FORGE CO.
2030 9th St.
ROCKFORD, ILL.

POOR AND COMPANY

Any Size **FORGINGS** *Any Specification*

CANTON FORGE & AXLE WORKS
2025 DUEBER AVE., S. W., CANTON, OHIO

GRAY IRON CASTINGS

Light and Medium Weight
Manufacturers of
Royal and Power Grinders

S. CHENEY & SON Manlius, New York

Products Index

ENGINES—Oil
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

EYELET MACHINES
Manville, E. J., Mch. Co., Waterbury, Ct.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

FACING CLAY
Carborundum Co., The, Perth Amboy, N.J.

FACTORY & PLANT SITES
Zoll, Edward H., 196 Market St., Newark, N. J.

FANS—Cooling
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS—Ventilating
American Blower Corp., 6000 Russell St., Detroit.
DeVilbiss Co., The, Toledo, Ohio.

FEED WATER HEATERS AND PURIFIERS
Harrisburg (Pa.) Steel Corp.

FEEDS—Hydraulic, for Machines
American Engineering Co., Philadelphia.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

FELT—Wool Mechanical
American Felt Co., 315 Fourth Ave., N.Y.C.

FENCING—Wire
Pittsburgh (Pa.) Steel Co.

FERROALLOYS
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROCHROME
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
Samuel, Frank, & Co., Inc., Philadelphia.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROMANGANESE
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
Samuel, Frank & Co., Inc., Philadelphia.

FERROMOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSILICO MANGANESE
Ohio Ferro-Alloys Corp., Canton, Ohio.
Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSILICON
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
Samuel, Frank, & Co., Inc., Philadelphia.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSILICON ALUMINUM
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSPIEGELEISEN
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

FERROTITANIUM
Titanium Alloys Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FILES & RASPS
Disston, Henry, & Sons, Inc., Philadelphia.
Nicholson File Co., Providence, R. I.

FILING MACHINES
Continental Machine Specialties, Inc., Minneapolis, Minn.

FILTER CLOTH—Asbestos
Johns-Manville Corp., 22 East 40th St., New York City.

FILTERS—Air
American Air Filter Co., Inc., Louisville, Ky.

FILTERS—Oil
National Acme Co., The, Cleveland.

FILTERS—Pressure or Gravity
Scaife, Wm. B., & Sons Co., Pittsburgh.

FIRE BRICK—Insulating
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Quigley Co., Inc., 56 West 45th St., N. Y. C.

FIRE CLAY
Carborundum Co., The, Perth Amboy, N. J.
Illinois Clay Products Co., Joliet, Ill.

FITTINGS—Brass, Pipe and Tube
Commonwealth Brass Corp., Detroit.

FLANGES—Forged Steel
Harrisburg (Pa.) Steel Corp.
Standard Steel Wks. Co., Burnham, Pa.

FLANGING WORK—Carbon and Alloy
Worth Steel Co., Claymont, Del.

FLEXIBLE SHAFT EQUIPMENT
Lovejoy Flexible Coupling Co., Chicago.
Strand, N. A., & Co., Chicago.

FLOODLIGHTS—Acetylene
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

FLOOR ARMORING
Acme Steel Co., Chicago, Ill.

FLOOR (CONCRETE) REPAIR MATERIALS
Flexrock Co., 892 N. Delaware Ave., Phila., Pa.

FLOOR PLATES—See Plates—Floor or Cellar Door

FLOORING—Acid Proof
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

FLOORING—Monolithic
Johns-Manville Corp., 22 East 40th St., New York City.

FLOORING—Open Steel
Blaw-Knox Co., Pittsburgh.
Hendrick Mfg. Co., Carbondale, Pa.

FLOORING—Steel
American Pressed Steel Co., Phila., Pa.

FLUX—Welding
Linde Air Prods. Co., The, 30 E. 42nd St., N. Y. C.

FORGING MACHINES—Roll
Ajax Mfg. Co., The, Euclid, Ohio.

FORGING MACHINES—Upset
Ajax Mfg. Co., The, Euclid, Ohio.

FORGINGS—Alloy Steel
Heppenstall Co., Pittsburgh.

FORGINGS—Aluminum
Aluminum Co. of America, Pittsburgh.

FORGINGS—Brass, Bronze or Copper
American Brass Co., The, Waterbury, Conn.
Commonwealth Brass Corp., Detroit.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

FORGINGS—Coin Pressed
Rockford (Ill.) Drop Forge Co.

FORGINGS—Drop, Iron or Steel
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., Erie, Pa.
Canton (Ohio) Drop Forging & Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Forging & Casting Corp., The, Ferndale, Mich.
Poor & Co., Canton Forge & Axle Wks., Canton, Ohio
Rockford (Ill.) Drop Forge Co.
Storms Drop Forging Co., Springfield, Mass.
Williams, J. H., & Co., Buffalo, N. Y.

FORGINGS—Hollow
Harrisburg (Pa.) Steel Corp.

FORGINGS—Hollow Bored
American Hollow Boring Co., 1912 Raspberry St., Erie, Pa.

FORGINGS—Hydraulic Press, Iron or Steel
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem (Pa.) Steel Company.
Mesta Mch. Co., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.
Standard Steel Wks. Co., Burnham, Pa.

FORGINGS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

FORGINGS—Upset
Bethlehem (Pa.) Steel Company.
Rockford (Ill.) Drop Forge Co.

FORMING MACHINES—Roll
Kane & Roach, Inc., Syracuse, New York.

FOUNDRY EQUIPMENT & SUPPLIES
Jeffrey Mfg. Co., The, Columbus, Ohio.
Whiting Corp., Harvey, Ill.

FURNACE ENGINEERS
Electric Furnace Co., The, Salem, Ohio.
Flinn & Dreffein Co., Chicago.
Surface Combustion Corp., 2375 Dorr St., Toledo.

FURNACES—Annealing & Case Hardening
American Gas Furnace Co., Elizabeth, N. J.
Electric Furnace Co., The, Salem, Ohio.
Leeds & Northrup Co., Philadelphia.
Surface Combustion Corp., 2375 Dorr St., Toledo.

FURNACES—Billet or Ingot Heating
Flinn & Dreffein Co., Chicago.
Surface Combustion Corp., 2375 Dorr St., Toledo.

FURNACES—Electric, Steel Melting
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
General Electric Co., Schenectady, N. Y.
Pittsburgh (Pa.) Lectromelt Furnace Corp.

Products Index

FURNACES—Enameling
Carborundum Co., The, Perth Amboy, N. J.
Electric Furnace Co., The, Salem, Ohio.
Surface Combustion Corp., 2375 Dorr St., Toledo.

FURNACES—Forging
Electric Furnace Co., The, Salem, Ohio.
Holcroft & Co., Detroit.
Surface Combustion Corp., 2375 Dorr St., Toledo.

FURNACES—Heat Treating, Automatic
Amer. Gas Furnace Co., Elizabeth, N. J.
Electric Furnace Co., The, Salem, Ohio.
Holcroft & Co., Detroit.
Leeds & Northrup Co., Philadelphia.
Rockwell, W. S., Co., 50 Church St., N.Y.C.
Surface Combustion Corp., 2375 Dorr St., Toledo.

FURNACES—Heat Treating, Cyanide of Lead
Chicago (Ill.) Flexible Shaft Co.
Electric Furnace Co., The, Salem, Ohio.
Surface Combustion Corp., 2375 Dorr St., Toledo.

FURNACES—Heat Treating, Electric
Electric Furnace Co., The, Salem, Ohio.
General Electric Co., Schenectady, N. Y.
Holcroft & Co., Detroit.
Hoskins Mfg. Co., Detroit, Mich.
Leeds & Northrup Co., Philadelphia.
Maehler, Paul Co., The, Chicago.
Rockwell, W. S., Co., 50 Church St., N.Y.C.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

FURNACES—Heat Treating, Oil or Gas
Chicago (Ill.) Flexible Shaft Co.
Electric Furnace Co., The, Salem, Ohio.
Holcroft & Co., Detroit.
Maehler, Paul Co., The, Chicago.
Rockwell, W. S., Co., 50 Church St., N.Y.C.
Surface Combustion Corp., 2375 Dorr St., Toledo.

FURNACES—Pack Hearting Sheets
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Wean Engineering Co., Inc., The, Warren, Ohio.

FURNACES—Rivet Heating, Electric
General Electric Co., Schenectady, N. Y.

FURNACES—Wire, Annealing and Galvanizing
General Electric Co., Schenectady, N. Y.
Surface Combustion Corp., 2375 Dorr St., Toledo.

GAGE BLOCKS
Ford Motor Co. (Johansson Division), Dearborn, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

GAGES—Dial
Starrett, L. S. Co., Athol, Mass.

GAGES—Electric
Sheffield Gage Corp., Dayton, Ohio.

GAGES—Plug and Snap
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

GAGES—Pressure & Vacuum Recording
Brown Instrument Co., The, Philadelphia, Pa.

GAGES—Thickness, for Rolling Mills
Haines Gauge Co., The, Phila., Pa.

GAGES—Thread Lead
Jones & Lamson Mch. Co., Springfield, Vt.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio.

GALVANIZING
Castle, Joseph P., & Bros., Phila.

GALVANIZING COMPOUNDS
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

GALVANIZING PLANTS—For Sheets
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Erie (Pa.) Foundry Co.

GAS ANALYSIS RECORDERS
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia.

GAS FOR INDUSTRIAL USES
American Gas Association, 420 Lexington Ave., N. Y. C.

GAS PRODUCERS
Flinn & Dreffein Co., Chicago.
Koppers Co., Pittsburgh.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., & Co., Philadelphia.

GAS RECOVERY COKE OVENS
Koppers Co., Pittsburgh.

GASKETS—Asbestos, Metal or Rubber
Garlock Packing Co., The, Palmyra, N. Y.
Johns-Manville Corp., 22 East 40th St., New York City.

GASKETS—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.

GEAR CHECKING EQUIPMENT
Michigan Tool Co., Detroit.

GEAR CUTTING
Burle Gear & Machine Co., Phila.
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Gleason Works, Rochester, N. Y.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Philadelphia (Pa.) Gear Works.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

GEAR CUTTING MACHINES
Brown & Sharpe Mfg. Co., Prov., R. I.
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Gleason Works, Rochester, N. Y.

GEAR DRIVES—Herringbone
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Lewis Foundry & Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Pitgh.

GEAR LAPPING MACHINES
Michigan Tool Co., Detroit.

GEARMOTORS
Allis-Chalmers Mfg. Co., Milwaukee.
James, D. O., Mfg. Co., Chicago.
Reliance Electric & Engng. Co., Cleveland.
Westinghouse Elec. & Mfg. Co., East Pitgh.

GEAR PLANNING MACHINES
Gleason Works, Rochester, N. Y.

GEAR SHAVING MACHINES
Michigan Tool Co., Detroit.

GEARS—Bevel
Boston Gear Wks., Inc., North Quincy, Mass.
Gleason Works, Rochester, N. Y.
James, D. O., Mfg. Co., Chicago.
Richardson Co., The, Melrose Park, Ill.

GEARS—Heat Treated
Gleason Works, Rochester, N. Y.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Simonds Mfg. Co., Pittsburgh.

GEARS—Herringbone
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Horsburgh & Scott Co., 5112 Hamilton Ave., Cleveland.
James, D. O., Mfg. Co., Chicago.
Jones, W. A. Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Mesta Mch. Co., Pittsburgh.
Philadelphia (Pa.) Gear Works.

GEARS—Machine Cut
Boston Gear Wks., Inc., North Quincy, Mass.
Cleveland (Ohio) Worm & Gear Co.
Gleason Works, Rochester, N. Y.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Simonds Mfg. Co., Pittsburgh.

GEARS—Non-Metallic
Boston Gear Wks., Inc., North Quincy, Mass.
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
General Electric Co., Schenectady, N. Y.
James, D. O., Mfg. Co., Chicago.

GEARS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

GEARS—Steel, Silent
Waldron, John, Corp., New Brunswick, N. J.

GEARS—Spur
Boston Gear Wks., Inc., North Quincy, Mass.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Philadelphia (Pa.) Gear Works.
Simonds Mfg. Co., Pittsburgh.

GEARS—Worm
Boston Gear Wks., Inc., North Quincy, Mass.
Cleveland (Ohio) Worm & Gear Co.
Horsburgh & Scott Co., 5112 Hamilton Ave., Cleveland.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Philadelphia (Pa.) Gear Works.

GENERATORS—Acetylene
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
Milburn, Alexander Co., The, Baltimore, Md.

GENERATORS—Electric
Fairbanks, Morse & Co., Chicago.
Lincoln Electric Co., The, Cleveland.
Reliance Electric & Engng. Co., Cleveland.
Westinghouse Elec. & Mfg. Co., East Pitgh.

GENERATORS—Electric, Second Hand. (See Clearing House Section)

GOGGLES—Safety
American Optical Co., Southbridge, Mass.

GOVERNORS—Air Compressor
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

GRADES—For Sheets and Coils
J-B Engineering Sales Co., 1738 Orange St., New Haven, Conn.

GRATING—Flooring, Sidewalk, etc.—See Flooring—Open Steel

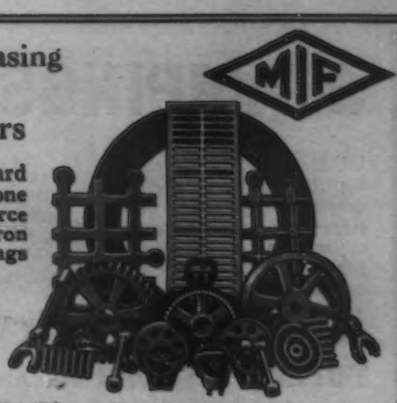
GREASE—Lubricating
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

GRILLES—Metal Cane
Diamond Mfg. Co., Wyoming, Pa.

GRILLES—Perforated Metal
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforated Co., Chicago.

You, Purchasing Agents and Plant Owners

often have a hard row to hoe. If one good reliable source of Malleable Iron and Steel Castings would make it any easier, let MIF show you how to eliminate one worry.



MALLEABLE IRON FITTINGS CO.
BRANFORD, CONN.

BALTIMORE MALLEABLE IRON AND STEEL CASTING COMPANY
ESTABLISHED 32 YEARS
BALTIMORE MARYLAND

MANUFACTURERS OF MALLEABLE IRON CASTINGS

NATIONAL BEARING METALS CORPORATION
ROLLING MILL BRONZE CASTINGS
Roll Neck Bearings — Acid Resisting Castings — Locomotive Castings
BLAST FURNACE COPPER
Housing Nuts — Machinery Castings — Car Journal Bearings
ALUMINUM BRONZE CASTINGS
Damascus & Keystone Bronze Div., PITTSBURGH, PA. • Chicago Div. CLEARING, ILL.

There is a
Toledo Alloy Steel
for every need
THE INDUSTRIAL STEEL CASTING CO.
Toledo, Ohio

From a Pound to a Ton ELECTRIC Inquiries Solicited
STEEL CASTINGS
CRUCIBLE STEEL CASTINGS COMPANY
LANSDOWNE, DELAWARE COUNTY, PENNSYLVANIA
(Near Philadelphia)

STAMPINGS!

With special emphasis on deep drawn shell work. Fifty years of stamping experience contribute to the fine jobs we are turning out here at Toledo.

Finishing facilities available. Inquiries will receive prompt attention.

TOLEDO STAMPING AND MFG. CO.

99 FEARING BLVD., TOLEDO, OHIO

Detroit Office—Starmfeltz-Lovely Bldg., Detroit, Mich.
Chicago Office: 333 North Michigan Ave., Chicago, Ill.

STAMPED METAL PARTS

WORCESTER STAMPED METAL ©

QUALITY STAMPINGS

for every industry

We have had many years of Light and Heavy Stamping Experience. We offer you the benefit of our knowledge and equipment.

WORCESTER STAMPED METAL CO.

Established 1883 — WORCESTER, MASS.

SHEET METAL WORK.

Small orders solicited as well as quantity production

Our facilities consist of shearing and forming equipment up to 10' and 3/16"; large number of presses, spot welders, oxy-acetylene and arc welders. Send us drawing or samples for prices.

CHAMPION SHEET METAL CO., Inc.

COR. SQUIRES AND DUANE STS. — CORTLAND, NEW YORK

STEEL STAMPINGS

FLAT AND FORMED PIECES OF MEDIUM SIZE OUR SPECIALTY

LIGHT WASHERS AND BURRS JAPANNING ELECTRO PLATING

J.H. SESSIONS & SON, Bristol, Conn., U. S. A.

Hayward Buckets

A bucket for every digging and rehandling need. . . . A size for every job.
THE HAYWARD CO., 46-50 Church St., N. Y.

Products Index

GRINDING AND POLISHING MACHINES
Excelsior Tool & Mch. Co., E. St. Louis, Ill.
Norton Co., Worcester, Mass.
Vonnegut Moulder Corp., 1807 Madison Ave., Indianapolis, Ind.

GRINDING MACHINES—Centerless
Cincinnati (Ohio) Grinders Incorporated.

GRINDING MACHINES—Chucking
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDING MACHINES—Cutter & Reamer
Cincinnati (Ohio) Milling Mch. Co., The.
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES—Cylinder
Heald Mch. Co., Worcester, Mass.
Hutto Machine Division, Carborundum Co., Detroit.

GRINDING MACHINES—Cylindrical
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati (Ohio) Grinders Incorporated.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Die
Landis Mch. Co., Inc., Waynesboro, Pa.

GRINDING MACHINES—Drill
Gallmeyer & Livingston Co., Grand Rapids, Mich.

GRINDING MACHINES—Gear & Worm
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

GRINDING MACHINES—Internal
Bryant Chucking Grinder Co., Springfield, Vt.
Greenfield (Mass.) Tap & Die Corp.
Heald Mch. Co., Worcester, Mass.
Hutto Machine Division, Carborundum Co., Detroit.

GRINDING MACHINES—Internal Centerless
Heald Mch. Co., Worcester, Mass.

GRINDING MACHINES—Internal Multiple Spindle
Baird Mch. Co., The, Bridgeport, Conn.

GRINDING MACHINES—Portable Electric
Wodack Electrical Tool Corp., Chicago.

GRINDING MACHINES—Portable Flexible Shaft
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Strand, N. A., & Co., Chicago.

GRINDING MACHINES—Portable Pneumatic
Cleveland (Ohio) Pneumatic Tool Co., The.
Ingersoll-Rand Co., 11 Broadway, New York City.
Warner & Swasey Co., The, Cleveland.

GRINDING MACHINES—Roll
Cincinnati (Ohio) Grinders Incorporated.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES—Saw
Heller Machine Co., 114 Liberty St., N. Y. C.

GRINDING MACHINES—Snagging
Vonnegut Moulder Corp., 1807 Madison Ave., Indianapolis, Ind.
Warner & Swasey Co., The, Cleveland.

GRINDING MACHINES—Surface
Abrasive Machine Tool Co., E. Prov., R. I.
Blanchard Machine Co., The, Cambridge, Mass.
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Heald Mch. Co., Worcester, Mass.
Norton Co., Worcester, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

GRINDING MACHINES—Swing Frame
Vonnegut Moulder Corp., 1807 Madison Ave., Indianapolis, Ind.

GRINDING MACHINES—Tap
Gallmeyer & Livingston Co., Grand Rapids, Mich.

GRINDING MACHINES—Tool
Cincinnati (Ohio) Milling Mch. Co., The.
Gisholt Machine Co., Madison, Wis.
Landis Tool Co., Waynesboro, Pa.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Universal
Cincinnati (Ohio) Grinders Incorporated.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Valve
Landis Tool Co., Waynesboro, Pa.

GRINDING WHEELS
Bakelite Corp., 247 Park Ave., N. Y. C.
Blanchard Machine Co., The, Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N.Y.
Macklin Co., Jackson, Mich.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Norton Co., Worcester, Mass.

GRINDING WHEELS—Segment
Blanchard Machine Co., The, Cambridge, Mass.

GRIT—Steel
Pittsburgh (Pa.) Crushed Steel Co.

HACK SAW BLADES—See Saws—Hack Saw Blades

HACK SAW MACHINES
Armstrong-Blum Mfg. Co., Chicago.
Peerless Mch. Co., Racine, Wis.

HAMMER BOARDS
Irwin, H. G., Lumber Co., 1129 State St., Erie, Pa.

HAMMERS—Air, Forging
Nazel Engineering & Machine Works, Philadelphia.

HAMMERS—Chipping & Riveting—Pneumatic
Cleveland (Ohio) Pneumatic Tool Co., The.
Ingersoll-Rand Co., 11 Broadway, New York City.

HAMMERS—Drop
Bliss, E. W., Co., Toledo, Ohio.
Erie (Pa.) Foundry Co.
Morgan Engineering Co., The, Alliance, O.
Standard Machinery Co., Providence, R. I.

HAMMERS—Helve
Bradley, C. C., & Son, Inc., Syracuse, N. Y.

HAMMERS—Pneumatic
Cleveland (Ohio) Pneumatic Tool Co., The.
Ingersoll-Rand Co., 11 Broadway, New York City.

HAMMERS—Portable Electric
Wodack Electric Tool Corp., Chicago.

HAMMERS—Power
Bradley, C. C., & Son, Inc., Syracuse, N. Y.

HAMMERS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., 1306 Elson Ave.

HAMMERS—Steam
Erie (Pa.) Foundry Co.
Morgan Engineering Co., The, Alliance, O.

HANGERS—Ball Bearing
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

HANGERS—Roller Bearing
Hyatt Bearings Div., General Motors Corp., Newark, N. J.

HARDNESS TESTING MACHINES
Shore Instrument & Mfg. Co., The, Jamaica, L. I., N. Y.

HEADING MACHINES
Ajax Mfg. Co., The, Euclid, Ohio.
Manville, E. J., Mch. Co., Waterbury, Ct.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

HEADS—Spun and Pressed
Central Iron & Steel Co., Harrisburg, Pa.
Worth Steel Co., Claymont, Del.

HEADS—Steel—Flanged & Dished
Central Iron & Steel Co., Harrisburg, Pa.

HEAT RESISTING PRODUCTS—Electric
Globar Div., The Carborundum Co., Niagara Falls, N. Y.
Holden, A. F., Co., New Haven, Conn.

HEAT TREATING
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
General Machine Wks., York, Pa.
Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.
Holden, A. F., Co., New Haven, Conn.
Parish Pressed Steel Co., Reading, Pa.

HEAT TREATING COMPOUNDS
Holden, A. F., Co., New Haven, Conn.

HEAT TREATING EQUIPMENT — Air Draw
Holden, A. F., Co., New Haven, Conn.
Maehler, Paul Co., The, Chicago.
Surface Combustion Corp., 2375 Dorr St., Toledo.

HEATING RESISTANCE — Non-Metallic
Globar Div., The Carborundum Co., Niagara Falls, N. Y.
Holden, A. F., Co., New Haven, Conn.

HOISTS—Air
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Detroit (Mich.) Hoist & Mach. Co.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Northern Engineering Works, Detroit.
Ridgway, Craig & Son Co., Coatesville, Pa.

HOISTS—Chain
Wright Mfg. Div., American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

HOISTS—Electric
American Engineering Co., Philadelphia.
Detroit (Mich.) Hoist & Mach. Co.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, Detroit, Mich.
Philadelphia (Pa.) Gear Works.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Wright Mfg. Div., American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

HOISTS—Electric Traveling
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

Products Index

HOISTS—Monorail
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

HOISTS—Scraper
Sullivan Machinery Co., Claremont, N. H.

HONING MACHINES
Micromatic Hone Co., Detroit.

HOSE—Flexible Metallic
American Brass Co., The, Waterbury, Conn.

HOSE—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

HYDRANTS—Fire
Wood, R. D., & Co., Philadelphia.

HYDRAULIC MACHINERY
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Elmes, Chas. P., Engng. Wks., Chicago.
Hydraulik Gmbh. Duisburg, Germany.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Morgan Engineering Co., The, Alliance, O.
Wood, R. D., & Co., Philadelphia.

INGOT MOLDS
Shenango Furnace Co., Pittsburgh.
Shenango-Penn Mold Co., Pittsburgh.
Snyder, W. P., & Co., Pittsburgh.
Valley Mould & Iron Corp., Hubbard, Ohio.

INGOTS—Aluminum
Aluminum Co. of America, Pittsburgh.
Seligman, Arthur, & Co., Inc., 30 Rockefeller Plaza, R. C. A. Bldg., N. Y. C.

INGOTS—Phosphor Bronze
Phosphor Bronze Smelting Co., The, Phila.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.
Du Pont de Nemours, E. I., & Co., Inc. Grasselli Chemicals Dept., Wilmington, Del.

INSTRUMENTS—Recording
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia.

INSULATION
Johns-Manville Corp., 22 East 40th St., New York City.

IRON—Genuine Open Hearth Iron
Newport (Ky.) Rolling Mill Co., The.

IRON—Rustless
Ludlum Steel Co., Watervliet, N. Y.

JIGS, FIXTURES, DIES, etc. (See Dies, Jigs, Fixtures, etc.)

KEYS—Riveted
Western Wire Prods. Co., St. Louis, Mo.

KEYSEATING MACHINES
Baker Bros., Inc., Toledo, Ohio.
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

LACING—Belt, Rawhide or Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

LACQUER
Sherwin-Williams Co., Cleveland.

LAGGING—Insulating
Quigley Co., Inc., 56 West 45th St., N. Y. C.

LAMPS—Filament
General Electric Co., Cleveland.

LAMPS—Mercury Vapor
General Electric Vapor Lamp Co., Hoboken, N. J.

LAPPING MACHINES
Cincinnati (Ohio) Grinders Incorporated.

LATHES—Automatic
Baird Mch. Co., The, Brideport, Conn.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Goss & De Leeuw Mch. Co., New Britain, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
LeBlond, R. K., Mch. Tool Co., Cincinnatti.
Monarch Mch. Tool Co., The, Sidney, O.

LATHES—Automatic Vertical
Baird Mch. Co., The, Bridgeport, Conn.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.

LATHES—Bench
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Rivett Lathe & Grinder, Inc., Boston, Mass.

LATHES—Brass
Warner & Swasey Co., The, Cleveland.

LATHES—Chucking
Jones & Lamson Mch. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.

LATHES—Coatour Turning
Monarch Mch. Tool Co., The, Sidney, O.

LATHES—Crankshaft
LeBlond, R. K., Mch. Tool Co., Cincinnati.

LATHES—Engine
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

LATHES—Roll
Lewis Foundry & Mch. Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Pitgh.

LATHES — Second-Hand. (See Clearing House Section)

LATHES—Toolroom
LeBlond, R. K., Machine Tool Co., Cincinnati, Ohio.
Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

LATHES—Turret
Acme Machine Tool Co., Cincinnati.
Bardons & Oliver, Cleveland.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Mch. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.

LATHES, Turret, Vertical
Bullard Co., The, Bridgeport, Conn.
Rogers Machine Wks., Alfred, New York.

LAYOUT FLUID
Dayton Rogers Mfg. Co., Minneapolis, Minn.

LEAD—In Oil
Sherwin-Williams Co., Cleveland.

LEAD LININGS
Dietzel Lead Burning Co., Pittsburgh.

LEATHER—Cup
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

LEVELING MACHINES
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Wean Engineering Co., Inc., The, Warren, O.

LINING—Converter
Edge Hill Silica Rock Co., New Brunswick, New Jersey.

LOCK WASHER MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

LOCOMOTIVES—Electric
Atlas Car & Mfg. Co., The, Cleveland.
Davenport (Iowa) Locomotives Works.
General Electric Co., Schenectady, N. Y.

LOCOMOTIVES—Gasoline
Plymouth (Ohio) Locomotive Works.

LOCOMOTIVES—Gas-Electric
Davenport (Iowa) Locomotives Works.

LOCOMOTIVES—Industrial
Davenport (Iowa) Locomotives Works.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Plymouth (Ohio) Locomotive Works.

LOCOMOTIVES—Steam
Iron & Steel Products, Inc., Chicago.

LOCOMOTIVES—Storage Battery
Atlas Car & Mfg. Co., The, Cleveland.

LUBRICANTS—Crusher & Grinding
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

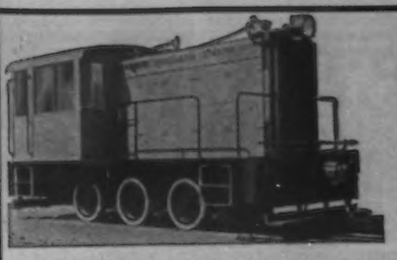
LUBRICANTS—Gear
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—High Pressure & Temperature
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Mine Cars
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Mining Machines
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Railroad
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.



Call it "GUTS" or "STAMINA" DAVENPORTS HAVE IT

Heavy hauls and light; long hauls and short; Subzero service and operation under the broiling sun; Uphill and down—bump, jerk, thump—a locomotive's existence is a tough one.

It's not enough to deliver reliable haulage service during a year or two; Davenports are built to serve dependably and economically through a generation or more. They are built to Last. They possess reserve stamina at the shock points. Meet your haulage needs with a proven Davenport.

This super-rugged transmission, an exclusive Davenport feature, is now standard on all mechanical drive Davenport Locomotives. Built to withstand the most severe shocks and strains through added years of service. (Patents Pending.)

Plant & Main Office—Davenport, Iowa

NEW YORK AND EXPORT OFFICE
30 Church St. Cable Address "Brosites"

Descriptive data, engineering consultation and recommendations FREE on request.

DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA, U. S. A.
A DIVISION OF THE DAVENPORT-BESLER CORPORATION

ELEVATORS Steam Hydraulic
The Ridgway Steam Hydraulic Elevator is PERFECTION for the man who has steam or air available.
Hundreds in use in Biggest Plants
"HOOK 'ER TO THE BILER!"
CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

DETROIT HOIST
ELECTRIC and PNEUMATIC
CAPACITIES ¼ to 10 TONS
DETROIT HOIST & MACHINE CO.

ROBBINS & MYERS INC.
SPRINGFIELD, OHIO
ELECTRIC and HAND HOISTS—CRANES

CONCO CRANES
BUILDERS FOR 20 YEARS—ALL TYPES, IN CAPACITIES TO 20 TONS — HOISTS — TROLLEYS
CONCO ENGINEERING WORKS
DIVISION OF H. D. CONKEY & COMPANY
405 CARLSON AVE - MENDOTA, ILL.

CRANES
All Types
Foundry Equipment
Special Machinery
Evaporation
Chemical Machinery
Pulverized Coal Equipment
Stokers

WHITING CORPORATION
HARVEY, ILL., U.S.A.
(CHICAGO, SUBURB)

LOCOMOTIVE CRANES
CRAWLER CRANES
SHOVELS

OHIO

THE OHIO LOCOMOTIVE CRANE CO.
BUCYRUS, OHIO

A Size and Type For Every Purpose
FRANCKE-GEAR TYPE FLEXIBLE COUPLINGS
Forged Steel Couplings that embody exclusive design features; provide utmost protection against shock loads and vibration. Low initial cost; trouble-free operation. Write for particulars.
JOHN WALDRON CORP.
NEW BRUNSWICK, N. J.

With Friction Load Brake!
The Canton Portable Crane is considered "the handiest tool in the shop," and now it contains an outstanding improvement —the safety friction load brake.
It is built in 8 sizes. Write for details about our 30 day trial offer.
Also manufacturers of Alligator Shears and Industrial Turntables
CANTON FOUNDRY & MACHINE CO.
6400 Breakwater Ave., Cleveland, Ohio

EARLE GEARS
The Earle Gear & Machine Co.
4715 Stenton Ave.
Philadelphia, Pa.
110 State St., Boston, Mass.
95 Liberty St., New York City
Cut Spur, Bevel, Herringbone and Worm Gears
All Sizes. Every Description Operating Machinery for Bridges, etc. "Les Simpler" Cold Metal Saws.

Need GEARS?
SEE SIMONDS
MAXIMUM SIZES

Spur Gears	145" Dia.
Bevel & Mitre Gears	60" Dia.
Worm Gears	72" Dia.
Worms	12" Dia.
Racks	10" Face, 1 D.P. / 9" Face, 3½ C.P.
Internal Gears	30" Dia., 4 D.P.

MATERIALS
Cast Iron
Cast Steel
Forged Steel
Non-Ferrous Metals
Rawhide
Bakelite
All-Steel Silent Pinions
SIMONDS
HEAT TREATED GEARS FOR SEVERE SERVICE
THE SIMONDS MANUFACTURING CO., PITTSBURGH, PA.

Products Index

LUBRICANTS—Roll Neck—Anti-Friction & Plain
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Tipple & Cleaning
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco; Shell Bldg., St. Louis, and 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

MACHINE GUARD MATERIALS
Erdle Perforating Co., Rochester, N. Y.

MACHINE WORK
General Machine Works, York, Pa.
Houde Engineering Corp., Buffalo, N. Y.
National Rubber Machinery Co., Clifton Div., Clifton, N. J.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

MACHINERY DEALERS — Second-Hand, (See Clearing House Section)

MACHINISTS' SMALL TOOLS
Starrett, L. S., Co., Athol, Mass.

MAGNESITE—Brick or Dead Burnt
Carborundum Co., The, Perth Amboy, N. J.

MAGNESIUM
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

MAGNETS—Lifting
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleve.
Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.

MALLETS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

MANDRELS—Expanding
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

MANHOLE FITTINGS AND SADDLES
Worth Steel Co., Claymont, Del.

MANIFOLDS—Oxygen & Acetylene
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

MARKING MACHINES
Noble & Westbrook Mfg. Co., The, East Hartford, Conn.

METAL SPECIALTIES
Crosby Co., The, Buffalo, N. Y.
Toledo (Ohio) Stamping & Mfg. Co.
Torrington (Conn.) Company.
Truscon Steel Co., Pressed Steel Div., Cleveland.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.
Worcester (Mass.) Stamped Metal Co.

METAL—Thermostatic Bimetal
Chace, W. M., Co., 1605 Beard Ave., Detroit.

METERS—Electric Welding
Lincoln Electric Co., The, Cleveland.

METERS—Flow
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia.

METERS—Water & Oil
Worthington Pump & Machinery Corp., Harrison, N. J.

MICA SCHIST
Edge Hill Silica Rock Co., New Brunswick, New Jersey.

MICROMETERS
Starrett, L. S., Co., Athol, Mass.

MICROMETERS—Automatic, for Rolling Mills
Haines Gauge Co., The, Phila., Pa.

MILLING MACHINES—Automatic
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.

MILLING MACHINES—Horizontal
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.

MILLING MACHINES—Planer Type
Cincinnati (Ohio) Planer Co.

MILLING MACHINES — Second - Hand, (See Clearing House Section)

MILLING MACHINES—Vertical
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.

MOLDING MACHINES
Tabor Mfg. Co., Phila., Pa.

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.

MONEL METAL
International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

MONORAIL SYSTEMS—Hand & Electric
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

MOTORS—Electric
Allis-Chalmers Mfg. Co., Milwaukee.
Century Electric Co., St. Louis, Mo.
Fairbanks, Morse & Co., Chicago.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., Cleveland.
Reliance Electric & Engineering Co., Cleveland.
Westinghouse Elec. & Mfg. Co., E. Pgh.

MOTORS—Electric, Second-Hand. (See Clearing House Section)

NAILS—Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Hassall, John, Inc., Clay & Oakland Sts., Bklyn., N. Y.
Pittsburgh (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.
Youngstown (Ohio) Sheet & Tube Co., The.

NICKEL
International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

NICKEL ANODES—Rolled or Cast
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

NICKEL SILVER
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

NITROGEN
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

NOZZLES—Sand Blasting
Norton Co., Worcester, Mass.

NUMBERING MACHINES—For Metal
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

NUT MACHINERY — Automatic Cold Pressed
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

NUTS—Acorn
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Castellated
National Acme Co., The, Cleveland.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Cold Punched
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Hot Pressed
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Lock
Standard Pressed Steel Co., Jenkintown, Pa.

NUTS—Machine Screw
Blake & Johnson Co., The, Waterville, Ct.

NUTS—Semi-Finished
Cleveland (Ohio) Cap Screw Co., The.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Thumb Malleable
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Wing
Parker-Kalon Corp., 196 Varick St., N. Y. C.

OIL & GREASE SEALS
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

OIL—Fuel, Low Sulphur
Bennett Oil Co., Inc., 366 Madison Ave., New York City.

OIL RETAINERS
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

OIL STONES
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

OILS—Cutting
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.

Products Index

Standard Oil Co. (Indiana), Chicago, Ill.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

OILS—Fuel
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago, Ill.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

OILS—Lubricating
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

OILS—Soluble—See Oils—Cutting

ORES—Iron
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Hanna Furnace Corp., The, Detroit, Mich.
Pickands Mather & Co., Cleveland.
Shenango Furnace Co., Pittsburgh.
Snyder, W. P., & Co., Pittsburgh.

OVENS—Coke and By-Product Recovery
Koppers Co., Pittsburgh.

OVENS—Core and Mold
Herrington & Randall, Inc., Detroit.
Holcroft & Co., Detroit.

OVENS—Cross Regenerative
Koppers Co., Pittsburgh.

OVENS—Enameling and Japanning
Carborundum Co., The, Perth Amboy, N. J.
Herrington & Randall, Inc., Detroit.
Maehler, Paul Co., The, Chicago.
Surface Combustion Corp., 2375 Dorr St., Toledo.

OXY-ACETYLENE — Shape-Cutting Machines
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

OXYGEN
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

PACKING—Felt
American Felt Co., 315 Fourth Ave., N. Y. C.

PACKING—Hydraulic
Rhoads, J. E. & Sons, Philadelphia.

PACKING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Rhoads, J. E., & Sons, Philadelphia.

PACKING—Metallic
Garlock Packing Co., The, Palmyra, N. Y.

PACKING—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

PACKING—Sheet, Asbestos or Rubber
Garlock Packing Co., The, Palmyra, N. Y.
Johns-Manville Corp., 22 East 40th St., New York City.

PAINT
Sherwin-Williams Co., Cleveland.

PERFORATED METAL
Chicago Perforating Co., 3440 W 24th Place, Chicago, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

PHOSPHOR—Copper
Phosphor Bronze Smelting Co., The, Phila.

PICKLING COMPOUNDS
American Chemical Paint Co., Ambler, Pa.

PICKLING MACHINES
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Mesta Mch. Co., Pittsburgh.

PICKLING TANK LININGS
Cellcote Co., The, Cleveland.

PICKLING TANK STEAM JETS
Dietzel Lead Burning Co., Pittsburgh.
Durion Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

PIG IRON
Bethlehem (Pa.) Steel Co.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Hanna Furnace Corp., The, Detroit, Mich.
Pickands Mather & Co., Cleveland.
Republic Steel Corp., Cleveland, Ohio.
Shenango Furnace Co., Pittsburgh.
Shenango-Penn Mold Co., Pittsburgh.
Superior Charcoal Iron Co., Grand Rapids, Mich.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

PIG IRON—Charcoal
Superior Charcoal Iron Co., Grand Rapids, Mich.

PILING—Steel Pipe
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PILING—Steel Sheet
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.

PINIONS—Rolling Mill
Mesta Mch. Co., Pittsburgh.

PINIONS—Wire and Rod
Rathbone, A. R. & J., Palmer, Mass.

PINS—Cotter
Lamson & Sessions Co., The, Cleveland.

PIPE—Cast Iron, S. & S. and Flanged
Wood, R. D., & Co., Philadelphia.

PIPE—Hammer Welded
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PIPE—New and Second-Hand
Albert & Davidson Pipe Corp., 2nd Ave., 50-51st St., Bklyn., N. Y.
Albert Pipe Supply Co., Inc., Berry and N. 13th St., Bklyn., N. Y.
Greenpoint Iron & Pipe Co., Inc.; Stagg & Bogart Sts., Bklyn., N. Y.

PIPE—Seamless Brass or Copper
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

PIPE—Spiral Welded
American Rolling Mill Co., Middletown, O.
Crane Co., Chicago.

PIPE—Standard, Black and Galvanized
Bethlehem (Pa.) Steel Co.
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Youngstown (Ohio) Sheet & Tube Co., The.

PIPE—Welded, Electric
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.

PIPE COVERING—Asbestos
Johns-Manville Corp., 22 East 40th St., New York City.

PIPE FITTINGS
Crane Co., Chicago.
Jarecki Mfg. Co., Erie, Pa.

PIPE THREADING & CUTTING MACHINES
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Curtis & Curtis Co., The, Bridgeport, Conn.
Jarecki Mfg. Co., Erie, Pa.
Landis Mach. Co., Inc., Waynesboro, Pa.
Merrell Mfg. Co., Toledo.
Murchey Machine & Tool Co., Detroit.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

PLANERS
Cincinnati (Ohio) Planer Co.

PLANING MACHINES — Second Hand. (See Clearing House Section)

PLASTICS—Laminated
Bakelite Corp., 247 Park Ave., N. Y. C.

PLASTICS — Laminated or Molded Phenolic
Richardson Co., The, Melrose Park, Ill.

PLASTICS—Molded
Bakelite Corp., 247 Park Ave., N. Y. C.

PLASTICS—Synthetic
Bakelite Corp., 247 Park Ave., N. Y. C.

PLATER'S CLEANING COMPOUND
American Chemical Paint Co., Ambler, Pa.

PLATES—Floor or Cellar Door
Alan Wood Steel Co., Conshohocken, Pa.
American Pressed Steel Co., Phila., Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Central Iron & Steel Co., Harrisburg, Pa.
Inland Steel Co., Chicago.

PLATES—Iron or Steel
Alan Wood Steel Co., Conshohocken, Pa.
American Pressed Steel Co., Phila., Pa.
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Central Iron & Steel Co., Harrisburg, Pa.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Joseph T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Worth Steel Co., Claymont, Del.
Youngstown (Ohio) Sheet & Tube Co., The.

PLATES—Rolled Manganese
Manganese Steel Forge Co., Phila., Pa.

PLATFORMS—Skid
Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.

PLUGS—Core Hole
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.

WM. B. SCAIFE & SONS
OAKMONT PA. — TANKS — PITTSBURGH DISTRICT
FOUNDED 1802
COPPER-BRAZED TANKS
ALSO
WELDED AND RIVETED CONSTRUCTION
A.S.M.E. CODE — I.C.C. SPECIFICATIONS
WATER PURIFYING APPARATUS
PITTSBURGH — NEW YORK — CHICAGO

INDUSTRIAL HEATING ENGINEERS
DESIGNING — CONSULTING — CONTRACTING
Guaranteed results on recommendations for new or improved equipment—processes—methods for any heating problem.
FLINN AND DREFFEIN CO.
308 W. Washington St. — Chicago, Ill.

BELMONT IRON WORKS
PHILADELPHIA — NEW YORK — KEYSTONE
Engineers-Contractors-Exporters
STRUCTURAL STEEL—BUILDINGS AND BRIDGES
RIVETED—ARC WELDED
BELMONT INTERLOCKING CHANNEL FLOOR
Write for Catalogue
Main Office: Phila., Pa. — New York Office: 44 Whitehall St.

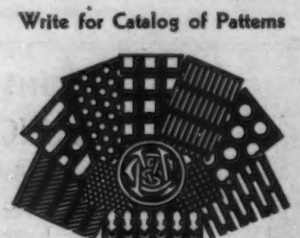
H. A. BRASSERT & CO.
CONSULTING ENGINEERS
for Iron, Steel, Fuel and Heavy Metallurgical Industries.
PROJECTS, PLANT DESIGN
CONSTRUCTION, OPERATION
MARKETS, FINANCE
AND MANAGEMENT
310 South Michigan Ave. — Chicago, Ill.

THE TORRINGTON SWAGING MACHINE
—with 4000 forceful squeezing hammer blows per minute — makes metal tougher and more elastic. Send for booklet—"The Modern Art of Swaging."
THE TORRINGTON CO., Standard Plant
55 Field Street — Torrington, Conn., U. S. A.

WIRE AND METAL RIBBON
FORMING MACHINERY
NILSON TILTING
WIRE REELS
(Wire Reel Catalog No. 51)
Special Machines Designed and Built to Order
THE A. H. NILSON MACHINE COMPANY, BRIDGEPORT, CONN.

PERFORATED METALS—SCREENS
Any size perforation — any gauge steel.
Promptly made to your exact specifications.
CHICAGO PERFORATING CO.
2440 W. 24TH PLACE Tel Canal 1459 CHICAGO, ILL.

HENDRICK
PERFORATED METALS
Perforated Metal Screens in Steel, Bronze, Stainless Steel, Monel, Aluminum, Everdur and other metals. Perforated Grilles in various metals and many special designs. Miteo Open Steel Flooring, Miteo Shur-Site Treads, Miteo Armorgrids; also elevator buckets, conveyor troughs and products fabricated from heavy plate. Write for catalog.
HENDRICK MFG. CO., 37 Dundaff St., Carbondale, Pa.
Sales Offices in Principal Cities
Please Consult Telephone Directory

MUNDT
PERFORATED METALS
The few perforations illustrated are indicative of the wide variety of our line—*we can perforate almost any size perforation in any kind of metal or material required.* Send us your specifications.
Sixty-seven years of manufacturing perforated metals for every conceivable purpose assure satisfaction.
Write for Catalog of Patterns

TIN, STEEL, COPPER, ALUMINUM, BRONZE, BRASS, ZINC, ANY METAL, ANY PURPOSE
CHARLES MUNDT & SONS
59 FAIRMOUNT AVE., JERSEY CITY, N. J.

Products Index

POLISHING & BUFFING MACHINES—Automatic
Packer Machine Co., The, Meriden, Conn.

POLISHING MACHINES
Continental Machine Specialties, Inc., Minneapolis, Minn.
Packer Machine Co., The, Meriden, Conn.

POLISHING MACHINES—Bar
Medart Co., The, St. Louis, Mo.

POWER UNITS—Rotary
New Departure Div., General Motors Corp., Bristol, Conn.

PRECIPITATORS—Electrostatic Dust
Pangborn Corporation, Hagerstown, Md.

PRESS FEEDS—Automatic
Littell, F. J., Mch. Co., Chicago.

PRESSED METAL PARTS
Champion Sheet Metal Co., Inc., cor. Squires & Duane Sts., Cortland, N. Y.
Crosby Co., The, Buffalo, N. Y.
Stanley Works, The, New Britain, Conn.; Bridgeport, Conn.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.

PRESSED STEEL PARTS
Crosby Co., The, Buffalo, N. Y.
Lansing (Mich.) Stamping Co., So. Penn Ave.
Parish Pressed Steel Co., Reading, Pa.
Toledo (Ohio) Stamping & Mfg. Co.
Truscon Steel Co., Pressed Steel Div., Cleveland.

PRESSES—Automatic
Bliss, E. W., Co., Toledo, Ohio.
Henry & Wright Mfg. Co., The, Hartford, Conn.
Niagara Mch. & Tool Wks., Buffalo, N. Y.
V & O Press Co., Hudson, N. Y.

PRESSES—Baling
Galland-Henning Mfg. Co., Milwaukee.

PRESSES—Baling, Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Galland-Henning Mfg. Co., Milwaukee.

PRESSES—Coining
Bliss, E. W., Co., Toledo, Ohio.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES—Drop—See Hammers—Drop

PRESSES—Foot
Baird Mch. Co., The, Bridgeport, Conn.
Niagara Machine & Tool Works, Buffalo, N. Y.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

PRESSES—Forging
Ajax Mfg. Co., The, Euclid, Ohio.
Hydraulik Gmbh, Duisburg, Germany.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, O.

PRESSES—Forming and Bending
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Niagara Mch. & Tool Wks., Buffalo, N. Y.

PRESSES—Friction Screw
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES—Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Elmes, Chas. F., Engng. Wks., Chicago.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hannifin Mfg. Co., Chicago.
Hydraulik Gmbh, Duisburg, Germany.
Lake Erie Engineering Corp., 68 Kenmore Sts., Buffalo, N. Y.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, O.
Oilgear Co., The, 1311 W. Bruce, Milwaukee.
Wood, R. D., & Co., Philadelphia.

PRESSES—Power
Bliss, E. W., Co., Toledo, Ohio.
Baird Mch. Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago, Ill.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hyman, Joseph, & Sons, Phila.
Manville, E. J., Mch. Co., Waterbury, Ct.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Machine & Tool Wks., Buffalo, N. Y.
Pels, Henry, & Co., Inc., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Standard Machinery Co., Providence, R. I.
V & O Press Co., Hudson, N. Y.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES—Trimming
Bliss, E. W., Co., Toledo, Ohio.
Erie (Pa.) Foundry Co.
Niagara Mch. & Tool Wks., Buffalo, N. Y.

PULLEYS—Iron, Solid & Split
Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.

PULLEYS—Magnetic
Cutler-Hammer, Inc., Milwaukee.

PULLEYS—Vacuum Cup
Vacuum Cup Metal Pulley Co., Inc., Detroit, Mich.

PULVERIZERS
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Whiting Corp., Harvey, Ill.

PUMPS—Acid Resisting
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

PUMPS—Boiler Feed
Aldrich Pump Co., The, Allentown, Pa.
Ingersoll-Rand Co. (Cameron), 11 Broadway, N. Y. C.

PUMPS—Centrifugal
Aldrich Pump Co., The, Allentown, Pa.
Fairbanks, Morse & Co., Chicago.
Ingersoll-Rand Co. (Cameron), 11 Broadway, N. Y. C.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Rumsey Pump Corp., Seneca Falls, N. Y.
Ruthman Machinery Co., Cincinnati.
Tomkins-Johnson Co., The, Jackson, Mich.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Coolant
Ruthman Machinery Co., Cincinnati.

PUMPS—Electric
Fairbanks, Morse & Co., Chicago.

PUMPS—Hydraulic
Aldrich Pump Co., The, Allentown, Pa.
American Engineering Co., Philadelphia.
Elmes, Chas. F., Engng. Wks., Chicago.
Fairbanks, Morse & Co., Chicago.
Lake Erie Engineering Corp., 68 Kenmore Sts., Buffalo, N. Y.
Rumsey Pump Corp., Seneca Falls, N. Y.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Power
Fairbanks, Morse & Co., Chicago.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Rotary Positive, Centrifugal & Turbine
Crane Co., Chicago.

PUMPS—Steam
Fairbanks, Morse & Co., Chicago.
Ingersoll-Rand Co. (Cameron), 11 Broadway, N. Y. C.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Vacuum
Pennsylvania Pump & Compressor Co., Easton, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUNCHES & DIES
Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

PUNCHING AND SHEARING MACHINES
Beatty Mch. & Mfg. Co., 936—150th St., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Cincinnati (Ohio) Shaper Co., The.
Excelsior Tool & Mach. Co., E. St. Louis, Ill.
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Niagara Machine & Tools Works, Buffalo, N. Y.
Pels, Henry, & Co., Inc., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Thomas Mach. Mfg. Co., Pittsburgh.

PYROMETERS—Indicating
Brown Instrument Co., The, Philadelphia, Pa.
Hoskins Mfg. Co., Detroit, Mich.
Leeds & Northrup Co., Philadelphia.

RAIL SPLICE BARS
Ames, W., & Co., Jersey City, N. J.

RAILS
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Foster, L. B., Co., Inc., Pittsburgh.
Frank, M. K., 480 Lexington Ave., N. Y. C.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

RAILS—Relaying
Hyman-Michaels Co., Chicago.
Iron & Steel Products, Inc., Chicago.
Sherwood, E. C., 50 Church St., N. Y. C.

RAILWAY EQUIPMENT & SUPPLIES
Fairbanks, Morse & Co., Chicago.
Iron & Steel Products, Inc., Chicago.

REAMERS
Cleveland (Ohio) Twist Drill Co., The.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

REAMING MACHINES
Blanchard Machine Co., The, Cambridge, Mass.

RECORDERS—Furnace Atmosphere
Brown Instrument Co., The, Philadelphia, Pa.

REELS—For Coil Stock
Littell, F. J., Mch. Co., Chicago.

REFRACTORIES
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Cleveland (Ohio) Quarries Co., The.
Illinois Clay Products Co., Joliet, Ill.

REGULATORS—Compressed Gas
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

REINFORCEMENT FABRIC—Concrete
Pittsburgh (Pa.) Steel Co.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

Products Index

RIDDLES—Foundry
Ludlow-Saylor Wire Co., St. Louis, Mo.

RINGS—Iron or Steel
Midvale Co., The, Nicetown, Phila., Pa.
Standard Steel Wks. Co., Burnham, Pa.

RINGS—Welded
American Welding & Mfg. Co., Warren, O.

RIVET MAKING MACHINERY
Manville, E. J., Mch. Co., Waterbury, Ct.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

RIVET SETS
Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

RIVETING MACHINES
Hannifin Mfg. Co., Chicago.
Shuster, F. B., Co., The, New Haven, Ct.

RIVETS
Blake & Johnson Co., The, Waterville, Ct.
Clark Bros. Bolt Co., Milldale, Conn.
Hassall, John, Inc., Clay & Oakland Sts., Bklyn., N. Y.
Progressive Mfg. Co., Torrington, Conn.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

RODS—Aluminum
Aluminum Co. of America, Pittsburgh.

RODS—Brass
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

RODS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

RODS—Nickel Silver
American Brass Co., The, Waterbury, Conn.
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

RODS—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

RODS—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

RODS—Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Electric Arc Cutting & Welding Co., The, Newark, N. J.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., The, Cleveland.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
Pittsburgh (Pa.) Steel Co.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Una Welding, Inc., Cleveland, Ohio.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City.

RODS—Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Bethlehem (Pa.) Steel Co.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
Youngstown (Ohio) Sheet & Tube Co., The.

ROLLING MACHINERY—Cold Rolling
Bliss, E. W., Co., Toledo, Ohio.
Cold Metal Process Co., The, Youngstown, Ohio.
Lewis Foundry & Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.

ROLLING MACHINERY—Sheet Metal
Lewis Foundry & Mch. Co., Pittsburgh.

ROLLING MILL MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Bliss, E. W., Co., Toledo, Ohio.
Cold Metal Process Co., The, Youngstown, Ohio.
Farrel-Birmingham Co., Inc., Ansonia, Ct.
Hyde Park (Pa.) Fdry. & Mch. Co.
Lewis Foundry & Mch. Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Fdry. Co., Avonmore, Pa.
Standard Machinery Co., Providence, R. I.
United Engineering & Fdry. Co., Ptgh.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

ROLLS—Alloy Steel
Pittsburgh (Pa.) Rolls Corp.

ROLLS—Bending and Straightening
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Bertsch & Co., Cambridge City, Ind.
Kane & Roach, Inc., Syracuse, New York.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Niagara Machine & Tool Works, Buffalo, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

ROLLS—Rubber Covered
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

ROLLS—Sand Chilled Iron and Steel
Aetna-Standard Engineering Co., The Youngstown, Ohio.
Hyde Park (Pa.) Fdry. & Mch. Co.
Lewis Foundry & Mch. Co., Pittsburgh.
Mackintosh-Hemphill Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
National Roll & Fdry. Co., Avonmore, Pa.
Pittsburgh (Pa.) Rolls Corp.
United Engineering & Fdry. Co., Ptgh.

ROLLS—Special Hardened
Midvale Co., The Nicetown, Phila., Pa.

ROOFING—Special Copper Bearing Steel
Newport (Ky.) Rolling Mill Co., The.
Superior Sheet Steel Co., Canton, Ohio.

ROOFING AND SIDING—Corrugated and Plain
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Johns-Manville Corp., 22 East 40th St., New York City.
Newport (Ky.) Rolling Mill Co., The.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

ROOFING AND SIDING—Genuine Open Hearth Iron
Newport (Ky.) Rolling Mill Co.

ROOFING AND SIDING—Iron and Steel
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.

ROOFING & SIDING—(Zinc)—Corrugated & Plain
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ROOFING MATERIALS
Carey, Philip, Co., The, Cincinnati.

RUBBER LININGS
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.

RUBBER MOLDED PARTS
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Richardson Co., The, Melrose Park, Ill.

RUST PREVENTIVES
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING COMPOUNDS
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING PROCESS
American Chemical Paint Co., Ambler, Pa.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
Udylite Co., The, Detroit.

RUST REMOVING
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

SAND BLAST EQUIPMENT AND MACHINES
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.

SAND BLAST STEEL SHOT
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.
Pittsburgh (Pa.) Crushed Steel Co.

SAND HANDLING EQUIPMENT
Bartlett, C. O.-Snow Co., The, Cleveland.
Jeffrey Mfg. Co., The, Columbus, Ohio.

SAWING MACHINES—Metal
Espen-Lucas Mch. Works, Phila.
Heller Machine Co., 114 Liberty St., N. Y. C.
Peerless Mch. Co., Racine, Wis.

SAWING MACHINES—Metal-Band
Continental Machine Specialties, Inc., Minneapolis, Minn.

SAWS—Band and Hack for Metal
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.
Wells Mfg. Corp., Three Rivers, Mich.

SAWS—Circular, Rip & Cutoff
Atkins, E. C., & Co., Indianapolis.

SAWS—Friction
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Hack Saw Blades
Atkins, E. C., & Co., Indianapolis.
Peerless Mch. Co., Racine, Wis.
Starrett, L. S., Co., Athol, Mass.

SAWS—Hot Metal
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Inserted Tooth, Cold
Disston, Henry, & Sons, Inc., Philadelphia.
Tabor Mfg. Co., Philadelphia.

SAWS—Milling
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

SCALES
Exact Weight Scale Co., Columbus, Ohio.
Fairbanks, Morse & Co., Chicago.

SCREENS—Manganese Steel
Manganese Steel Forge Co., Phila., Pa.

SCREENS—Perforated Metal
Chicago Perforating Co., 2440 W. 24th Place, Chicago, Ill.

Select the
Right Metal
Such factors of use as danger of product spoilage, seriousness of interruption of service, accessibility, cost of changing, govern the economics of Perforated Metals. Sometimes it is best to use a less expensive metal and change it more frequently. Other times it pays best to buy higher priced special alloys. Wickwire Spencer engineers will be glad to aid you in making the most economical selection. Request literature, or better yet, invite our representative to call. Send for complete information.
WICKWIRE SPENCER STEEL COMPANY
43 East 42nd Street, New York
Buffalo Worcester
Chicago San Francisco
WICKWIRE SPENCER
perforated metals

A SUPERIOR
REFRACTORY
LAGGING
for
TEMPERATURES
UP TO 2200° F.

INSULAG

• Extraordinary high refractory and insulating properties. Used where other lagging materials fail. Easily applied on hot or cold surfaces. Expands after application and retains increased volume. Develops high mechanical strength upon drying. Durable; water resistant; light weight; withstands shock, abrasion and vibration.

Write for Bulletin IA 327

QUIGLEY COMPANY, INC.
50 W. 45th Street, New York, N. Y.
Makers of HYTEMPITE, *"The World's Standard High Temperature Cement"*
Distributors with Stocks and Service in Important Industrial Centers throughout the United States, Canada, and in 32 other countries.
In Canada: Quigley Company of Canada, Limited, Lachine, P. Q.

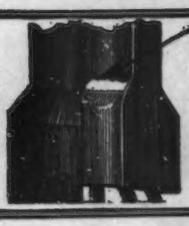
"CERTIFIED" STEEL ABRASIVES

ONE BAG DOES THE WORK OF A TON OF SAND

REDUCES COST

PITTSBURGH CRUSHED STEEL CO.
PITTSBURGH, PENNA.

STEEL SHOT AND GRIT CO.
BOSTON, MASS.



Mica Schist Lining Fuses Into One Piece

Large blocks make placement easy and rapid—flat, thin pieces for patching—pulverized for cement or daub. No waste. A practical and economical lining.

EDGE HILL SILICA ROCK CO.
NEW BRUNSWICK, N. J.

ROLLS—CASTINGS

Sand and Chilled ROLL LATHES
TIN PLATE MACHINERY

HYDE PARK FOUNDRY & MACHINE CO.
HYDE PARK, PA. (Conemaugh Div. P. R. R.)

STEWART
INDUSTRIAL
FURNACES OF ALL KINDS
Chicago Flexible Shaft Co., 1146 S. Central Ave., Chicago, U. S. A.
Canada Factory: 321 Weston Rd., S., Toronto • New York Office: 11 W. 42nd St., N.Y.

MOORE RAPID
LECTROMELT FURNACES
For the rapid and economic melting and refining of gray and malleable irons, carbon and alloy steels, etc.
PITTSBURGH LECTROMELT FURNACE CORPORATION
P. O. Box 1257 Pittsburgh, Pa.

Products Index

Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.

SCREENS—Woven Wire
Ludlow-Saylor Wire Co., St. Louis, Mo.
Michigan Wire Cloth Co., 2117 Howard St., Detroit.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

SCREW MACHINE PRODUCTS
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Blake & Johnson Co., The, Waterville, Ct.
Commonwealth Brass Corp., Detroit.
Eastern Mch. Screw Corp., New Haven.
Houde Engineering Corp., Buffalo, N. Y.
National Acme Co., The, Cleveland.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Peck Spring Co., The, Plainville, Conn.
Progressive Mfg. Co., Torrington, Conn.
Screw Mch. Products Corp., Prov., R. I.

SCREW MACHINERY—Automatic
Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.

SCREW MACHINERY—Hand
Warner & Swasey Co., The, Cleveland.

SCREW MACHINERY—Multiple Spindle
Acme Machine Tool Co., Cincinnati.
Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.

SCREW PLATES
Greenfield (Mass.) Tap & Die Corp.

SCREW STOCK
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.

SCREWS—Cap
Cleveland (Ohio) Cap Screw Co., The.
Lamson & Sessions Co., The, Cleveland.
National Acme Co., The, Cleveland
Ottemiller, Wm. H., Co., Inc., York, Pa.

SCREWS—Coach or Lag
Lamson & Sessions Co., The, Cleveland.

SCREWS—Machine
Blake & Johnson Co., The, Waterville, Ct.
Progressive Mfg. Co., The, Torrington, Ct.

SCREWS—Safety Set
Progressive Mfg. Co., The, Torrington, Ct.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Set
Cleveland (Ohio) Cap Screw Co., The.
National Acme Co., The, Cleveland.
Ottemiller, Wm. H., Co., Inc., York, Pa.

SCREWS, Socket, Head, Cap
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Thumb
Parker-Kalon Corp., 196 Varick St., N. Y.

SCRUBBING MACHINES—Sheet
Wean Engineering Co., Inc., The, Warren, Ohio.

SCYTHE STONES AND WHETSTONES
Carborundum Co., The, Niagara Falls, N.Y.

SECOND - HAND MACHINERY—(See Clearing House Section)

SEPARATORS—Magnetic
Dings Magnetic Separator Co., Milkauwee.
Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

SHAFTING—Cold Drawn
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAFTING—Forged
Bay City Forge Co., Erie, Pa.

SHAFTING—Steel
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.

SHAFTING—Turned and Ground
Bliss & Laughlin, Inc., Harvey, Ill.
Ryerson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAPERS
Cincinnati (Ohio) Shaper Co., The.

SHAPERS—Vertical
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

SHAPES—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAPES—Wire
American Spring & Mfg. Corp., Holly, Mich.
Cuyahoga Spring Co., The, Cleveland.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Roebling's, John A. Sons Co., Trenton, N. J.

SHEAR BLADES & KNIVES
American Shear Knife Co., Homestead, Pa.
Heppenstall Co., Pittsburgh.

SHEARING MACHINES—Alligator
Canton Fdry. & Mch. Co., Cleveland.

SHEARING MACHINES—Angle, Hand and Power
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

SHEARING MACHINES—Bar
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Ptgh.

SHEARING MACHINES — Beam and Channel
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Ptgh.

SHEARING MACHINES—Billet
Morgan Engineering Co., The, Alliance, O.
Pels, Henry, & Co., Inc., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Ptgh.

SHEARING MACHINES — Continuous Sheet & Pack
Aetna-Standard Engineering Co., The, Youngstown, Ohio.

SHEARING MACHINES—Plate
Bertsch & Co., Cambridge City, Ind.
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, Buffalo, N. Y.
Pels, Henry, & Co., Inc., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Ptgh.

SHEARING MACHINES — Sheet and Plate
Beatty Mch. & Mfg. Co., 936—150th St., Hammond, Ind.
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Niagara Mach. & Tool Wks., Buffalo, N. Y.

SHEARING MACHINES—Squaring
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Co., Chicago.
Niagara Mach. & Tool Wks., Buffalo, N. Y.

SHEARS—Hand for Sheet Metal
Bremil Mfg. Co., Erie, Pa.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Jones & Laughlin Steel Corp., Pittsburgh.

SHEET METAL MACHINERY
Bliss, E. W., Co., Toledo, Ohio.
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Kane & Roach, Inc., Syracuse, New York.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
V & O Press Co., Hudson, N. Y.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

SHEETS—Aluminum
Aluminum Co. of America, Pittsburgh.

SHEETS—Auto Body
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Inland Steel Co., Chicago.
Republic Steel Corp., Cleveland, Ohio.
Youngstown (Ohio) Sheet & Tube Co., The.

SHEETS—Black
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Granite City (Ill.) Steel Co.
Ingersoll Steel & Disc Co., Chicago.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos., T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.

SHEETS—Blue Annealed
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Great Lakes Steel Corp., Detroit.
Newport (Ky.) Rolling Mill Co., The.
Ryerson, Jos. T., & Son, Inc., Chicago.
Weirton (W. Va.) Steel Co.
Worth Steel Co., Claymont, Del.

SHEETS—Brass, Bronze, Copper, Nickel, Silver or Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

SHEETS—Chrome
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Chrome Nickel
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SHEETS—Cold Rolled
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos., T., & Son, Inc., Chicago.
Weirton (W. Va.) Steel Co.

Products Index

SHEETS—Copper Alloy
American Brass Co., The Waterbury, Conn.

SHEETS—Copper Steel
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.

SHEETS—Electrical
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Cleveland, Ohio.

SHEETS—Enameling
American Rolling Mill Co., Middletown, O
Carnegie-Illinois Steel Corp. (U. S. Stee Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp Subsidiary), San Francisco, Calif.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.

SHEETS—For Drawing and Stamping
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Superior Sheet Steel Co., Canton, Ohio.
Worth Steel Co., Claymont, Del.

SHEETS—Full Finished
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Cleveland, Ohio.
Youngstown (Ohio) Sheet & Tube Co., The.

SHEETS—Galvanized, Flat and Corrugated
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

SHEETS—Long Terne
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The.
Weirton (W. Va.) Steel Co.

SHEETS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

SHEETS—Metal Furniture
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The.
Republic Steel Corp., Cleveland, Ohio.

SHEETS—Pickled
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The.

SHEETS—Tin Mill Black
American Rolling Mill Co., Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The.

SHEETS—Zinc
New Jersey Zinc Co., The, 160 Front St.,

SHELVING—Steel
Frick-Gallagher Mfg. Co., The, Wellston, Ohio.

SHUTTERS—Steel & Wood Bi-Folding
Kinnear Mfg. Co., Columbus, Ohio.

SILICO—MANGANESE
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

SILICON METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

SLABS
Andrews Steel Co., The, Newport, Ky.

SLINGS—Wire Rope
Roebling's, John A., Sons Co., Trenton, N. J.

SLOTTING MACHINES
Nazel Engineering & Machine Works, Philadelphia.

SOLVENTS—Oil & Grease
Detroit Rex Products Co., Detroit, Mich.

SPACING TABLES—Punching & Shearing
Thomas Mach. Mfg. Co., Pittsburgh.

SPECIAL MACHINERY
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Bullard Co., The, Bridgeport, Conn.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Houde Engineering Corp., Buffalo, N. Y.
Manville, E. J., Mch. Co., Waterbury, Ct.
Morgan Engineering Co., The, Alliance, O.
National Rubber Machinery Co., Clifton Div., Clifton, N. J.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.
Wood, R. D., & Co., Philadelphia.

SPECIALTIES—Rubber Covered & Lined
Goodrich, B. F., Co., The, Akron, Ohio.

SPEED REDUCERS
Boston Gear Wks., Inc., North Quincy, Mass.
Cleveland (Ohio) Worm & Gear Co.
Horsburgh & Scott Co., 5112 Hamilton Ave., Cleveland.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd, Chicago.
Link-Belt Co., Chicago.
Philadelphia (Pa.) Gear Works.

SPIEGELEISEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

SPIKES—Screw
Oliver Iron & Steel Corp., Pittsburgh.

SPIKES—Track
Ames, W., & Co., Jersey City, N. J.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Weirton (W. Va.) Steel Co.

SPINDLES—Grinding
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

SPINDLES—Hollow Bored
American Hollow Boring Co., 1912 Raspberry St., Erie, Pa.

SPLICE BARS
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SPRAY FINISHING EQUIPMENT
DeVilbiss Co., The, Toledo, Ohio.

SPRAYERS—Paint
DeVilbiss Co., The, Toledo, Ohio.

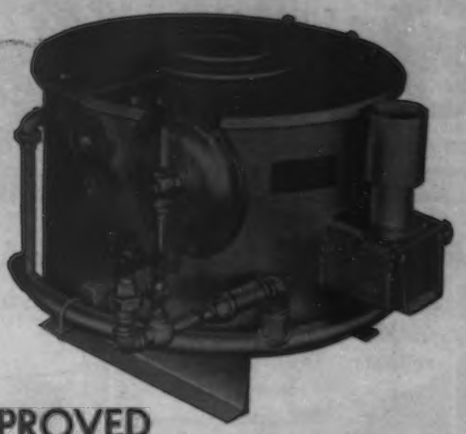
SPRING MAKING MACHINERY
Baird Mch. Co., The, Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRINGS—Car
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.

SPRINGS—Extension, Compression, Torsion or Flat
Amer. Spring & Mfg. Corp., Holly, Mich.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Cook Plant of Barnes-Gibson-Raymond, Div. of Associated Spring Corp., Ann Arbor, Mich.
Cuyahoga Spring Co., The, Cleveland.
Dunbar Bros. Co., Div. of Associated Spring Corp., Bristol, Conn.
Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
Peck Spring Co., The, Plainville, Conn.
Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

SPROCKETS
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Boston Gear Wks., Inc., North Quincy, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

STAMPINGS OR DRAWINGS—Metal
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Boerum, A. L., Co., 7115 Charles St., Phila., Pa.
Central Iron & Steel Co., Harrisburg, Pa.
Champion Sheet Metal Co., Inc., cor. Squires & Duane Sts., Cortland, N. Y.
Cook Plant of Barnes-Gibson-Raymond, Div. of Associated Spring Corp., Ann Arbor, Mich.
Crosby Co., The, Buffalo, N. Y.
Dayton Rogers Mfg. Co., Minneapolis, Minn.
Dunbar Bros. Co., Div. of Associated Spring Corp., Bristol, Conn.
E S M C O Auto Products Corp., Bush Terminal Bldg. 27, Bklyn., N. Y.
Eastern Tool & Stpg. Co., Inc., Saugus, Mass.
Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.
Lansing (Mich.) Stamping Co., So. Penn. Ave.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Miller & Van Winkle, Inc., 18 Bridge St., Brooklyn, N. Y.
National Machine Tool Co., Racine, Wis.
Parish Pressed Steel Co., Reading, Pa.
Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.
Sessions, J. H., & Son, Bristol, Conn.
Toledo (Ohio) Stamping & Mfg. Co.
Torrington (Conn.) Company
Truscon Steel Co., Pressed Steel Div., Cleveland.



IMPROVED
POT HARDENING FURNACES

Faster and more uniform heating—lower gas consumption—simpler control—silent operation.

For operating at temperatures up to 1600° F. Automatic Temperature Control available if desired. Regularly supplied for use with lead, cyanide, neutral salt or a carburizing salt as the heating medium. Available in pot diameters from 6" to 20".

Write for Bulletin IA 8-37

American Gas Furnace Co.
Elizabeth, New Jersey

New
CONTINUOUS AUTOMATIC
STRAIGHTENING *and* POLISHING
Bar, Tube *and* Wire Machines

Combine all the necessary features of Speed, Precision, Capacity and Safety... Steel rolls set in Medart-Timken Bearings...Driving gears completely enclosed...Also Continuous Automatic Centerless Round Bar and Tube Turners, built in several types.

THE MEDART COMPANY • *General Offices and Works:* 3510 De Kalb St., St. Louis, Mo.

MEDART

SINCE 1832
Bradley
The name to remember for CUSHIONED POWER HAMMERS
C. C. BRADLEY & SON, INC. Syracuse, N.Y.

PARKER-KALON Cold-forged
CAP NUTS
Superior in strength, finish, appearance, uniformity. Get samples and prices. Compare!
Parker-Kalon Corp., 200 Varick St. New York

UNBRAKO
FREE SAMPLES FOR DOUBTING THOMASES
DEALERS EVERYWHERE — PROMPT DELIVERIES
STANDARD PRESSED STEEL CO.
Box 523 Jenkintown, Pa.

NAILS, RIVETS & SCREWS MADE TO ORDER IN ANY METAL
JOHN HASSALL, INC. EST. 1850 CLAY & OAKLAND STS., BROOKLYN, N.Y.

SCREW MACHINE PRODUCTS
CAP AND SET SCREWS
WM. H. OTTEMILLER CO., Inc.
Pattison St., & M. & P.R.R. York, Pa.

SCREW MACHINE PRODUCTS
ACCURATELY MADE AT A FAIR PRICE
ARE MORE ECONOMICAL
Specialists in the production of screw machine products for 15 years. Let us quote on your requirements.
Screw Machine Products Corp., 1014 Eddy St., Providence, R.I.

SPRINGS
For all mechanical purposes up to and including 9/16 gage round or square wire.
Also wire forms and springs of flat spring steel. We specialize in lighter wire gages.
U. S. STEEL WIRE SPRING COMPANY
East 53rd St. & Hamilton Ave., Cleveland, Ohio

Build to excel with
LEE-BUILT SPRINGS
COMPRESSION — EXTENSION — FLAT — TORSION
WIRE FORMS — SMALL STAMPINGS
LEE SPRING COMPANY, Inc.
30 MAIN STREET : BROOKLYN, N. Y.

Products Index

Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.
Worcester (Mass.) Stamped Metal Co.

STAMPS—Steel Alphabets and Figures
Cunningham, M. E., Co., Pittsburgh.
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

STAPLES—Wire
Wickwire Brothers, Cortland, N. Y.

STEEL—Acid Resisting
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

STEEL—Alloy
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Bissett Steel Co., The, Cleveland.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Harrisburg (Pa.) Steel Corp.
Ingersoll Steel & Disc Co., Chicago.
Jessop Steel Co., Washington, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Alloy, Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL—Bright Finished
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.

STEEL—Carbon
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Harrisburg (Pa.) Steel Corp.
Ingersoll Steel & Disc Co., Chicago.
Latrobe (Pa.) Electric Steel Co.

STEEL—Carbon Vanadium
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Manganese
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Nickel
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Nickel Silver
Ingersoll Steel & Disc Co., Chicago.

STEEL—Chrome Vanadium
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Latrobe (Pa.) Electric Steel Co.

STEEL—Cobalt
Darwin & Milner, Inc., Cleveland.

STEEL—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Pittsburgh.
Latrobe (Pa.) Electric Steel Co.
Rathbone, A. B. & J., Palmer, Mass.
Ryerson, Joseph T., & Son, Inc., Chicago.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL—Cold Rolled Strips
Acme Steel Co., Chicago.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Athenia Steel Co., Clifton, N. J.
Bethlehem (Pa.) Steel Co.
Cold Metal Process Co., The, Youngstown, Ohio.
Griffin Mfg. Co., Erie, Pa.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Sons, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn.; Bridgeport, Conn.
Steel & Tubes, Inc., Cleveland.
Superior Steel Corp., Grant Bldg., Pgh.
Thomas Steel Co., The, Warren, Ohio.
Weirton (W. Va.) Steel Co.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Cold Rolled Strips, Electro Copper Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Electro-Galvanized
Acme Steel Co., Chicago, Ill.
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Electro Tin Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strips, Stainless
Acme Steel Co., Chicago.
Griffin Mfg. Co., Erie, Pa.

STEEL—Corrosion Resisting
Midvale Co., The, Nicetown, Phila., Pa.

STEEL—Crucible
Jessop Steel Co., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Cutlery
Jessop Steel Co., Washington, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Die
Andrews Steel Co., The, Newport, Ky.
Disston, Henry, & Sons, Inc., Philadelphia.
Jessop, Wm., & Sons, Inc., 121 Varick St., N. Y. C.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.

STEEL—Drill
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.

STEEL—Electric
Disston, Henry, & Sons, Inc., Philadelphia.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—High Speed
Bethlehem (Pa.) Steel Company.
Ingersoll Steel & Disc Co., Chicago.
Jessop Steel Co., Washington, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Hot Rolled Strips
Acme Steel Co., Chicago.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Laclede Steel Co., St. Louis, Mo.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn., Bridgeport, Conn.
Steel & Tubes, Inc., Cleveland.
Superior Steel Corp., Grant Bldg., Pgh.
Weirton (W. Va.) Steel Co.

STEEL—Hot Rolled Strips, Electro Zinc Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Hot Rolled Strips, Galvanized
Acme Steel Co., Chicago.

STEEL—Magnet
Latrobe (Pa.) Electric Steel Co.

STEEL—Nickel
Andrews Steel Co., The, Newport, Ky.

STEEL—Open Hearth
Andrews Steel Co., The, Newport, Ky.
Pittsburgh (Pa.) Steel Co.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Rolled Manganese
Manganese Steel Forge Co., Phila.

STEEL—Rustless
Acme Steel Co., Chicago.
Griffin Mfg. Co., Erie, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Rustless Iron & Steel Corp., Baltimore, Md.

STEEL—Screw
Bliss & Laughlin, Inc., Harvey, Ill.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL—Special Analysis
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Spring
Athenia Steel Co., Clifton, N. J.
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace, Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.
Great Lakes Steel Corp., Detroit.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL-Stainless
Acme Steel Co., Chicago.
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company.

Products Index

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Disston, Henry & Sons, Inc., Philadelphia.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Sons, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Superior Steel Corp., Grant Bldg., Pittsburgh.
Union Drawn Steel Co., Massillon, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Stainless Clad
Ingersoll Steel & Disc Co., Chicago.

STEEL—Tool
Bethlehem (Pa.) Steel Company.
Bissett Steel Co., The Cleveland.
Darwin & Milner, Inc., Cleveland.
Disston, Henry, & Sons, Incs., Philadelphia
Ingersoll Steel & Disc Co., Chicago.
Jessop Steel Co., Washington, Pa.
Jessop, Wm., & Sons, Inc., 121 Varick St., N. Y. C.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Midvale Co., The, Nicetown, Phila., Pa.
Milne, A., & Co., 745 Washington St., N. Y. C.
Ryerson, Jos., T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Windau Steel Co., Cleveland.

STEEL—Tool, Special Shapes
Forging & Casting Corp., The, Ferndale, Mich.
Latrobe (Pa.) Electric Steel Co.

STEEL—Vanadium
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL PLANTS AND ROLLING MILLS
Brassert, H. A., & Co., Chicago, Ill.

STEEL ROLLS
United Engineering & Fdry. Co., Ptgh.

STOKERS
Babcock & Wilcox, The, 85 Liberty St., New York City.
Whiting Corp., Harvey, Ill.

STOP WATCHES
Stillman, M. J., Co., Inc., Chicago.

STOPS—Crane Limit
Electric Controller & Mfg. Co., The, Cleveland.

STRAIGHTENING MACHINES—Bar & Tube
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Kane & Roach, Inc., Syracuse, New York.
Medart Co., The, St. Louis, Mo.

STRAIGHTENING MACHINES—Wire
Kane & Roach, Inc., Syracuse, New York.

STRUCTURAL IRON AND STEEL WORK
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Bethlehem (Pa.) Steel Co.
Morgan Engineering Co., The, Alliance, O.

STRUCTURAL STEEL—See Angles, Beams, Channels and Tees

STUDS
Erie (Pa.) Bolt & Nut Co.

SUPERHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

SWAGING MACHINES
Etna Machine Co., The, Toledo, Ohio.
Standard Machinery Co., Providence, R. I.
Torrington (Conn.) Company.

SWITCHES—Electric
Westinghouse Elec. & Mfg. Co., East Ptgh.

TANK LININGS
Ceilcote Co., The Cleveland.
Nukem Prods. Corp., 68 Niagara St., Buffalo, N. Y.

TANK LININGS—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Mnhattan, Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Alkali Cleaning
Detroit Rex Products Co., Detroit, Mich.

TANKS—Compressed Air, Gas, Oil and Water
Petroleum Iron Works Co., The, Sharon, Pa.
Scaife, Wm. B., & Sons Co., Ptgh.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

TANKS—Iron and Steel
Munroe R., & Sons Mfg. Corp., Pittsburgh.
Petroleum Iron Works Co., The, Sharon, Pa.
Scaife, Wm. B., & Sons, Co., Ptgh.

TANKS—Lead Lined
Dietzel Lead Burning Co., Pittsburgh.

TANKS—Pickling
Atlas Mineral Prods. Co. of Pa., The, Mertztown, Pa.
Blaw-Knox Co., Pittsburgh.
Cleveland (Ohio) Quarries Co., The.
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

TANKS—Rubber Lined
Blaw-Knox Co., Pittsburgh.
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Welded
Blaw-Knox Co., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Petroleum Iron Works Co., The, Sharon, Pa.
Scaife, Wm. B., & Sons Co., Pittsburgh.

TAPPING MACHINES
Baker Bros., Inc., Toledo, Ohio.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.
National Automatic Tool Co., Richmond, Ind.

TAPS—Collapsing
Landis Mach. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.
National Acme Co., The, Cleveland.

TAPS AND DIES
Greenfield (Mass.) Tap & Die Corp.
Landis Mch. Co., Inc., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

TEES—See Angles, Beams, Channels and Tees

TELEPHONES—Interior
Screw Machine Products Corp., Prov., R. I.

TERNE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Weirton (W. Va.) Steel Co.

TESTING MACHINES—Materials
Baldwin-Southwark Corp., Southwark Div., Phila.

THERMOMETERS—Recording
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia.

THERMOSTATIC—Bimetal
Chace, W. M., Co., 1605 Beard Ave., Detroit.

THREAD CUTTING TOOLS—See Die Taps

THREAD ROLLING MACHINES
Manville, E. J., Mch. Co., Waterbury, Ct.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

THREADING MACHINES
Eastern Mesh. Screw Corp., New Haven, Conn.
Landis Mch. Co., Inc., Waynesboro, Pa.

THREADING MACHINES—Automatic
Landis Mch. Co., Inc., Waynesboro, Pa.

THREADING MACHINES—Belt
Murchey Machine & Tool Co., Detroit.

TIE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Weirton (W. Va.) Steel Co.

TIES—BALE
Acme Steel Co., Chicago, Ill.

TIMING INSTRUMENTS
Stillman, M. J., Co., Inc., Chicago.

TIN PLATE
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

TIN PLATE MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Wean Engineering Co., Inc., The, Warren, Ohio.

TINNING EQUIPMENT—Sheets
Wean Engineering Co., Inc., The, Warren, Ohio.

TONGS—Automatic
Heppenstall Co., Pittsburgh.

TOOL BITS
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TOOL HOLDERS
Armstrong Bros. Tool Co., Chicago.
Williams, J. H., & Co., Buffalo, N. Y.

TOOLS—Lathe
Armstrong Bros. Tool Co., Chicago.
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TOOLS—Metal Cutting
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.
Michigan Tool Co., Detroit.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

TOOLS—Precision
Starrett, L. S., Co., Athol, Mass.

TOOLS—Safety, Steel Stamp
Cunningham, M. E., Co., Pittsburgh.

31 YEARS OF EXPERIENCE
SPRINGS
STAMPINGS
WIRE FORMS
Estimates made on any quantity .. any material
IT WILL PAY YOU TO INQUIRE

M. D. HUBBARD, Pres. P. M. HUBBARD J. A. HUBBARD, Sec'y
M. D. HUBBARD SPRING CO.
750 CENTRAL AVE., PONTIAC, MICH.

SPRINGS
BY
DUNBAR
BROTHERS CO. BRISTOL, CONN.
DIVISION OF ASSOCIATED SPRING CORPORATION
for every INDUSTRIAL APPLICATION

FRANK SAMUEL AND COMPANY, INC.
Snowden Samuel, President S. A. Cochran, Vice-Pres.
Harrison Bldg. Philadelphia, Pa.
60% FERRO-MANGANESE ELECTROLYTIC
ENGLISH LOW PHOS. PIG IRON FRENCH FOUNDRY
MUCK BARS
LOW PHOS. & STAYBOLT AMERICAN SWEDO IRON CO.'S
MANGANESE ORE
OPEN HEARTH USE BLAST FURNACE USE
IRON ORES
AFRICAN LUMP CHROME ORES SAMCO GROUND
Branch Offices:
24 Alban Rd., Boston, Mass. 40 Exchange Place, New York, N. Y.

PUT FLOORS IN SERVICE

REPAIRS PREVENT ACCIDENTS

Don't neglect broken, rutted concrete floors . . . they cause serious accidents and result in sloppy inefficiency. Necessary repairs can be made quickly with RUGGEDWEAR RESURFACER. This material provides a firmer, smoother, tougher, more rugged wearing surface. Easily applied. Bonds to a feather edge. Dries fast. Used for patches or over an entire area . . . indoors or out. Costs only 10 cents to 14 cents per sq. ft.

RUGGEDWEAR Is The Only Resurfacer Made With A Cellulose Product.

FREE: *4-page illustrated folder "Floors under heavy trucking conditions." Write for it today—no obligation. Ask about FREE TRIAL OFFER.*

FLEXROCK CO., 892 N. Delaware Ave., Philadelphia, Pa.

RUGGEDWEAR
SWEEP-MIX-APPLY-30 HOURS DRY
RESURFACER

THE BEST KNOWN NAME IN IRON

HANNA

HANNA has been casting pig iron in sizes to suit melters' requirements for 70 years.

HANNA PIG IRON

THE HANNA FURNACE CORPORATION
MERCHANT PIG IRON DIVISION
OF NATIONAL STEEL CORPORATION
Buffalo Detroit New York Philadelphia Boston

Products Index

Spring Washer Industry, 616 Wrigley Bldg., Chicago, Ill.
Washburn Co., The, Worcester, Mass.

WASHERS—Spring
American Nut & Bolt Fastener Co., Pittsburgh.
Beall Tool Co., East Alton, Ill.
Butcher & Harb Mfg. Co., Toledo, Ohio.
Eaton Mfg. Co., Massillon, Ohio.
Hobbs Mfg. Co., Worcester, Mass.
National Lock Washer Co., The, Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., The, Newark, N. J.
Spring Washer Industry, 616 Wrigley Bldg., Chicago, Ill.
Washburn Co., The, Worcester, Mass.

WASHING MACHINES—For Metal Parts
Ransohoff, N., Inc., Cincinnati.

WATER SOFTENERS AND PURIFIERS
Scaife, Wm. B., & Sons Co., Ptgh.

WELDING—Copper Hydrogen Electric
Bundy Tubing Co., Detroit, Mich.

WELDING—Electric
Lincoln Electric Co., The, Cleveland.
Una Welding, Inc., Cleveland, Ohio.
Westinghouse Elec. & Mfg. Co., East Ptgh.

WELDING CONTACTORS
Clark Controller Co., The, Cleveland.

WELDING CONTACTS—Resistance
Electroloy Co., Inc., 50 Church St., New York City.

WELDING AND CUTTING MACHINES AND EQUIPMENT—Oxy-Acetylene
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The., 30 East 42nd St., N. Y. C.
Milburn, Alexander Co., The, Baltimore, Md.
Weldit Acetylene Co., Detroit.

WELDING FIXTURES
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Una Welding, Inc., Cleveland, Ohio.

WELDING MACHINES—Butt
Swift Electric Welder Co., Detroit.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Electric Arc
Electric Arc Cutting & Welding Co., The, Newark, N. J.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Hobart Bros., Troy, Ohio.
Lincoln Electric Co., The, Cleveland.
Una Welding, Inc., Cleveland, Ohio.
Westinghouse Elec. & Mfg. Co., East Ptgh.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City.

WELDING MACHINES—Electric Arc, Second-Hand. (See Clearing House Section)

WELDING MACHINES—Flash
Swift Electric Welder Co., Detroit.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Press
Swift Electric Welder Co., Detroit.

WELDING MACHINES—Spot
Swift Electric Welder Co., Detroit.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Universal Spot & Arc
Electric Arc Cutting & Welding Co., The, Newark, N. J.

WHEELS—Rolled Steel
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Standard Steel Wks. Co., Burnham, Pa.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh.

WIRE—Barb
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.

WIRE—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Michigan Wire Cloth Co., 2117 Howard St., Detroit.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

WIRE—Electric Heat Resisting
Globar Div., The Carborundum Co., Niagara Falls, N. Y.

WIRE—Flat, Round Square or Special Shapes
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, O.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE—Insulated
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Roebling's, John A., Sons Co., Trenton, N. J.
Simplex Wire & Cable Co., Cambridge A. Boston, Mass.

WIRE—Mattress
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE—Netting
Ludlow-Saylor Wire Co., St. Louis, Mo.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Cortland, N. Y.

WIRE—Piano and Music
Webb Wire Works, New Brunswick, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

WIRE—Special Drawn Shapes
Rathbone, A. B. & J., Palmer, Mass.

WIRE—Spring
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

WIRE—Spring (Music)
Webb Wire Works, New Brunswick, N. J.

WIRE—Stainless Steel
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Webb Wire Works, New Brunswick, N. J.

WIRE—Steel
Bethlehem (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.

WIRE—Water-proof Rubber Insulated
Simplex Wire & Cable Co., Cambridge A. Boston, Mass.

WIRE—Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Lincoln Electric Co., The, Cleveland.
Manganese Steel Forge Co., Phila., Pa.
Maurath, Inc., 7400 Union Ave., Cleveland.
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh (Pa.) Steel Co.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Una Welding, Inc., Cleveland, Ohio.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH
Audubon Wire Cloth Corp., Phila., Pa.
Buffalo (N. Y.) Wire Wks. Co., Inc.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Michigan Wire Cloth Co., 2117 Howard St., Detroit, Mich.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE DRAWING MACHINERY—See Wire Mill Mchry. & Equip.

WIRE FORMING MACHINERY
Baird Mch. Co., The, Bridgeport, Conn.
Manville, E. J., Mch. Co., Waterbury, Ct.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE MILL MACHINERY AND EQUIPMENT
Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

WIRE NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE PRODUCTS
American Spring & Mfg. Corp., Holly, Mich.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Buffalo (N. Y.) Wire Wks. Co., Inc.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Hindley Mfg. Co., Valley Falls, R. I.
Pittsburgh (Pa.) Steel Co.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE ROPE
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Leschen, A., & Sons Rope Co., St. Louis, Mo.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE ROPE FITTINGS
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE STRAIGHTENING AND CUTTING MACHINERY—Automatic
Shuster, F. B., Co., The, New Haven, Ct.

WRENCHES
Armstrong Bros. Tool Co., Chicago.
Williams, J. H., & Co., Buffalo, N. Y.

WRENCHES—Pipe
Greenfield (Mass.) Tap & Die Corp.

WRENCHES—Pneumatic
Ingersoll-Rand Co., 11 Broadway, N. Y. C.

ZINC—SLAB (Spelter)
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ZINC—Strip
Platt Bros. & Co., The, Waterbury, Conn.

ZIRCONIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

Products Index

TOOLS—Tungsten Carbide
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

TORCHES—Brazing, Cutting and Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
Milburn, Alexander Co., The, Baltimore, Md.
Weldit Acetylene Co., Detroit.

TORCHES—Gas
Torit Mfg. Co., St. Paul, Minn.

TRACTORS AND TRAILERS—See Trucks, Tractors and Trailers—Industrial

TRAILERS—Industrial—See Trucks, Tractors and Trailers—Industrial

TRAMRAILS—Overhead Systems
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

TRAMWAYS—Wire Rope
Lerchen, A., & Sons Rope Co., St. Louis, Mo.

TRANSCRIBING MACHINES
Dictaphone Sales Corp., 420 Lexington Ave., New York City.

TRANSMISSIONS—Hydraulic
American Engineering Co., Philadelphia.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

TRANSMISSIONS—Variable Speed
Link-Belt Co., Chicago.
Reeves Pulley Co., Columbus, Indiana.

TRAPS—Steam
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.

TREADS—Safety
American Pressed Steel Co., Phila., Pa.
Blaw-Knox Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Norton Co., Worcester, Mass.

TROLLEYS
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.

TRUCKS—Dump (Industrial)
Towmotor, Inc., Cleveland.

TRUCKS—Elevating (Power)
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.
Towmotor, Inc., Cleveland.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TRUCKS—Factory, Hand
Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.

TRUCKS—Lift (Hand & Foot)
Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TRUCKS—Scoop (Industrial)
Towmotor, Inc., Cleveland.

TRUCKS, TRACTORS AND TRAILERS—Industrial
Atlas Car & Mfg. Co., The, Cleveland.
Baker-Raulang Co., The, 2175 W. 25 St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.
Towmotor, Inc., Cleveland.
Yale & Towne Mfg. Co., The, Phila., Div., Phila., Pa.

TUBE MILL MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
United Engineering & Fdry. Co., Pgh.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

TUBES—Boiler
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Steel & Tubes, Inc., Cleveland.

TUBES—Copper Alloy
American Brass Co., The, Waterbury, Conn.

TUBES—High Carbon
Steel & Tubes, Inc., Cleveland.

TUBES—Nickel Silver
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

TUBES—Stainless Steel
Cleveland (Ohio) Tool & Supply Co., The.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ryerson, Jos., T., & Son, Inc., Chicago.
Steel & Tubes, Inc., Cleveland.

TUBING—Aluminum Seamless
Aluminum Co. of America, Pittsburgh.

TUBING—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

TUBING—Nichrome
Steel & Tubes, Inc., Cleveland..

TUBING—Open Seam
Steel & Tubes, Inc., Cleveland.

TUBING—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

TUBING—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.

TUBING—Seamless Steel
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Ryerson, Jos. T., & Son, Inc., Chicago.
Steel & Tubes, Inc., Cleveland.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Youngstown (Ohio) Sheet & Tube Co., The.

TUBING—Square and Rectangular
Steel & Tubes, Inc., Cleveland.

TUBING—Stainless Steel
Cleveland (Ohio) Tool & Supply Co., The.
Steel & Tubes, Inc., Cleveland.

TUBING—Tinned Brass or Copper
Bundy Tubing Co., Detroit, Mich.

TUBING—Tinned-Steel
Bundy Tubing Co., Detroit, Mich.

TUBING—Tool Steel
Bissett Steel Co., The, Cleveland.

TUBING—Welded Steel
Bundy Tubing Co., Detroit, Mich.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes, Inc., Cleveland.
Youngstown (Ohio) Sheet & Tube Co., The.

TUBULAR PRODUCTS
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes, Inc., Cleveland.

TUMBLING BARRELS—See Barrels—Tumbling

TUNGSTEN—Metals & Alloys
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

TUNGSTEN CARBIDE
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TURBINE-GENERATORS—Steam
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TURBO-COMPRESSORS
Spencer Turbine Co., Hartford, Conn.

TURNTABLES
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

TURNTABLES—Industrial
Canton Fdry. & Mch. Co., Cleveland.

TWIST DRILLS
Cleveland (Ohio) Twist Drill Co., The.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

TYPE—Steel
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

UNIONS
Crane Co., Chicago.

UNIT HEATERS—Electric
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.

VALVES—Acid Resisting
Dietzel Lead Burning Co., Pittsburgh.
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

VALVES—Air Blast for Presses
Littell, F. J., Mch. Co., Chicago.

VALVES—Air & Hydraulic Control
Brown Instrument Co., The, Philadelphia, Pa.
Galland-Henning Mfg. Co., Milwaukee.
Hannifin Mfg. Co., Chicago.
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

VALVES—Gas, Water and Steam
Brown Instrument Co., The, Philadelphia, Pa.
Crane Co., Chicago.
Jarecki Mfg. Co., Erie, Pa.
North American Mfg. Co., The, Cleveland.
Wood, R. D., & Co., Philadelphia.

VALVES—Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Crane Co., Chicago.
Galland-Henning Mfg. Co., Milwaukee.
Wood, R. D., & Co., Philadelphia.

VALVES—(Pressure Sealed) Pneumatic
Cleveland (Ohio) Pneumatic Tool Co., The.

VALVES—Proportioning
Brown Instrument Co., The, Philadelphia, Pa.
North American Mfg. Co., The, Cleveland.

VALVES—Pump, Rubber
Garlock Packing Co., The, Palmyra, N. Y.

VANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

VARNISH—Acid Resisting
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

VISES
Cincinnati (Ohio) Milling Mch. Co., The.
Jarecki Mfg. Co., Erie, Pa.

WASHERS—Iron or Steel
Sessions, J. H., & Son, Bristol, Conn.

WASHERS—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

WASHERS—Lock
American Nut & Bolt Fastener Co., Pittsburgh.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio.
Eaton Mfg. Co., Massillon, Ohio.
Heiz & Heiz, Inc., 33—34th St., Brooklyn, N. Y.
Hobbs Mfg. Co., Worcester, Mass.
Houde Engineering Corp., Buffalo, N. Y.
National Lock Washer Co., The, Newark, N. J. and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., The, Newark, N. J.

MITCO
OPEN STEEL FLOORING
Pressure Formed · 90% Open Area · Easy to Install
HENDRICK MANUFACTURING COMPANY
37 Dundaff Street, Carbondale, Pa.

MUSIC WIRE
THE WEBB WIRE WORKS
NEW BRUNSWICK, N. J.

CHEMICALS ACP PROCESSES
OVER-PICKLING AND ACID WASTE PREVENTED WITH RODINE
AMERICAN CHEMICAL PAINT CO.
Ambler, Pa.

Specialists in wire cloth and wire products since 1869. Plain or galvanized steel and all other metals for every industrial purpose.
Ask for catalog 10-K.
Buffalo Wire Works Co., Inc.
(Established 1869 as Schoeler's Sons)
456 Terrace Buffalo, N. Y.

Buffalo WIRE
A BETTER WIRE CLOTH

WIRE SHAPES
of every kind
HINDLEY MFG. CO., Valley Falls, R.I., U.S.A.

WIRE IRON STEEL
All Sizes Finishes
THE SENECA WIRE & MFG. CO. FOSTORIA, O.

THE CLEARING HOUSE

SEND FOR "GREEN LIST"

JUST ISSUED

Automatics—No. 2-G Brown & Sharpe
3¼", 4¼" Gridley Sgle. Spdl.
Boring Machines, 5" bar, N-B-P Floor Borer
5" Bar Newton Portable
No. 3 Hamilton, 4½" bar
No. 2 Coffman, 3¾" bar
No. 36—Rochester Floor, 3½" bar
No. 3A Universal, 3" bar
No. 1 Cleveland, 2½" bar
Boring Mills, 24", 36", 42" Bullard "New Era"
30" King
42" and 48" Colburn
52" and 60" King
54", 60" Colburn
Drills—1, 2, 3, 4 spdl. Leland-Gifford
1, 2, 3, 4, 6 Spdl. Henry & Wright
32" Cinn.-Bickford Sltd. Hd.
No. 2 Colburn, 1, 2, 3 & 4 Spdl.
No. 3—24" Defiance
Nos. 121, 314, 513 Baker
No. 210—1 and 3 spdl. Barnes
No. D-5 Colburn
No. 2 Western Multiple
No. 14 Natco Multiple
No. 4 Baush Multiple
Radials—4' Cinn.-Bickford Plain
4' American Triple Purpose
4' American Plain
5' American full univ., M.D.
6' Western Triple Grd.
6' American Triple Purpose
6' Cinn.-Bickford full univ.
Gear Cutters. No. 18-H Gould & Eberhardt
No. 16 HS Gould & Eberhardt
No. 4—48" Brown & Sharpe
No. 6—60" Brown & Sharpe
No. 6—72" Brown & Sharpe
96" Newton heavy duty
Nos. 6, 61, 62, 65, 615, 625 Fellows
12"x72" G. & E. Rack Cutter
Grinders, Heim Centerless
16"x48" Landis, crankshaft
10"x36", 52" Landis, plain
20"x168" Landis, plain M.D.
26"x96" Landis, plain
No. 13 B. & S. Univ. Cutter & Tool
No. 4—12"x66" Landis Universal
No. 70 Heald Internal
No. 1½ Landis, Internal
No. 10 Blanchard, M.D.
No. 16-A Blanchard Surface
16" Arter Rotary Surface
15"x17"x6', 8' Norton, O.S. surf., mag. chuck

MOTOR DRIVE NORTON GRINDERS

6"x32"	10"x96"
16"x18"	14"x36"
10"x24"	14"x50"
10"x36"	14"x72"
10"x50"	16"x50"
10"x72"	18"x96"
18"x144"	

Lathes, No. 3 Lodge & Shipley Duomatic
14"x 6' American, grd. hd., T.A.
14"x 6' Lodge & Shipley
16"x 8' Lodge & Shipley, Taper Attach.
18"x 8' Lodge & Shipley, sel. grd. hd., T.A.
18"x10' Reed-Prentice, grd. hd.
20"x14' L. & S., sel. grd. hd.
24"x12' Lodge & Shipley, sel. grd. hd.
24"x16' American grd. hd., T.A.
26"x14' LeBlond Crankshaft
30"x20' American grd. hd.
36"x18' Lodge & Shipley, patent head
36"x30' Rahn Larmon, grd. head
54"x23' Johnson, triple geared
66"x21', Putnam triple geared
Millers, No. 24 Hvy. Ohio, plain
No. 2, No. 3, No. 3-S Cincinnati, plain
No. 2-B, No. 3-B, No. 4-B, B. & S., plain
No. 4 and No. 5 Cincinnati, plain
No. 1½, No. 2, B. & S. Universal
No. 2-BS Milwaukee Universal
No. 3, No. 4 Cincinnati Universal
No. 2, No. 3 Cincinnati, H.P. Vert.
No. 3-B Milwaukee Vert.
No. 4 Milwaukee Vert.
No. 5—48" Cincinnati Hydromatic
No. 4 and No. 8 Lees-Bradner Thread
Hanson Whitney Thread
24"x24"x12' Ingersoll Slab
36"x36"x12' Newton Duplex
38"x44"x20' Ingersoll Slab
48"x36"x16' Ingersoll Adj. Rail
Planers, 24"x24"6' American
30"x30"x 6' and 18' Cincinnati
30"x30"x14' Gray, Arr. Rev., M.D.
36"x36"x12' and 24' Gray
36"x36"x 8', 12', 18' Cincinnati
36"x36"x14'—24' Cleveland Open Side
42"x42"x30' Niles-Bement-Pond. arr. rev., M.D.
48"x48"x10' Detrick & Harvey, O. S.
48"x46"x14' Liberty Open Side
48"x48"x16' Niles-Bement-Pond
60"x48"x16' Gray, arr. rev., M.D.
72"x60"x16' American
Presses, No. 106 Bliss Double Crank
No. 173-A Consolidated Dble. Crank
Shapers, 16" Gould & Eberhardt
16" & 20" Stockbridge
20" & 24" Gould & Eberhardt
Turret Lathe No. 4 W. & S. Univ. Turret
No. 3 Cinn.-Acme, A.C. & B.F.
No. 3-A Warner & Swasey
No. 4-A Warner & Swasey 7¾" H.S.
No. 4-L Gisholt 9¼" H.S.

HILL-CLARKE MACHINERY CO
647 Washington Blvd. - Chicago

CAPITAL SAVINGS!

BORING MILLS—Horizontal

CLEVELAND No. 1
BEAMAN & SMITH 5" and 6" bar
DETRICK & HARVEY 5" bar

BORING MILLS—Vertical

BULLARD 24"
BAUSH 53": 2 hds.
KING 60": 2 swivel heads
NILES BEMENT POND 7-10" Extension
NILES BEMENT POND 42"—44"—51"—53"
POND 90": 2 hds.

PLANERS

AMERICAN 36"x36"x20': 3 hds.
CINCINNATI 36"x36"x12': 2 hds.
NBP 48"x48"x16': 4 hds.
BETTS 10"x18': 4 hds.

LATHES

PITTSBURGH 36"x28', grd. hd.
PUTNAM 36"x28', 3 step cone, DBG.
PUTNAM 36"x28', Grd. Head—Nearly New
BRIDGEFORD 36"x60' comb. boring and turning
BRIDGEFORD 36"x60', boring
AMERICAN 36"x21', grd. hd., QCG.
GREAVES KLUSMAN 16"x10' grd. motor-in-base
McCABE 27-49x16' Double Spindle
LODGE & SHIPLEY 24"x10' cone dr.
GREAVES KLUSMAN 16"x8' motor-in-base
LODGE & SHIPLEY 36"x16' grd. hd.

MILLING MACHINES

ROWBOTTOM 24" Cam Milling Machine
CINCINNATI 24", 48" Automatic
INGERSOLL No. 3 Combined heavy duty Vert.
INGERSOLL 24"x24"x12', planer type
INGERSOLL 24"x24"x12', slab
NEWTON No. 2 Ver. spdle. keyseat
BROWN & SHARPE No. 4 Universal cone dr.
CINCINNATI Nos. 2, 3, 4 Plain
LEES BRADNER No. 4 thread
PRATT & WHITNEY 4½x12, 6x48, 6x80 thread
BECKER C-I and C Vertical
KEARNEY & TRECKER No. 1 Plain standardized spdle.

1—AMERICAN 36" x 21' all Geared Head Engine Lathe—NEARLY NEW

DRILL PRESSES

NATCO No. 12, No. 13, No. 22 Multiple spdle.
NATCO C11 Drill—mechanical feeds
NATCO C13H Drill—hydraulic feeds
PRATT & WHITNEY No. 12 rest. head

DRILLS—RADIAL

CINCINNATI BICKFORD 5' full Univ.
CINCINNATI BICKFORD 6' Pla. SPD.
DRESES 3' and 5' Pl. SPD.
REED PRENTICE 4' Pl.
N.B.P. 8' Pl. SPD.

GEAR CUTTING EQUIPMENT

BROWN & SHARPE No. 6, 72" Gear Cutter
BARBER & COLMAN Nos. 3 and 12 Gear Hobbers
BROWN & SHARPE No. 54 Gear Hobber
CLEVELAND 8 spdle. Spline Hobber
GLEASON 15" Spiral Bevel Gear Finisher
GLEASON 10" Spiral Bevel Gear
FELLOWS No. 8B Burnisher
LEES BRADNER Lapper, cap. 1¼"x8"

GRINDERS

BRYANT No. 3 Internal
BLANCHARD Nos. 10, 16 surface
HEALD Nos. 50, 55, 60, 65 Intl.
HEALD No. 72 Hydr.; 72-A-3 Sizematic
LANDIS 10x24, 10x36, 10x72
LANDIS 20"x10' Plain
LANDIS 20x132 cylindrical
NORTON 14x72, 14x96 Plain Cyl.
NORTON type B8I 14x30-36" crankpin
DIAMOND 84" Face
PRATT & WHITNEY No. 14 surface
SPRINGFIELD No. 7 Grinder

MISCELLANEOUS

CLEVELAND ⅜": 2-2½": 2¼-2¾" Model "A"
CLEVELAND Univ. relieving lathe
TREADWELL 12" pipe mach.
COCHRANE & BLY No. 14 Univ. Shaper & Miller
LIBBY 18" Model "A", 26"—7½" hole
HILLES & JONES No. 5 Bending Rolls
PRATT & WHITNEY No. 12 Profiler, grd.

ask for details
1000 other machines in stock

MOREY MACHINERY CO., INC
410 BROOME ST. NEW YORK

BORING MILLS

42", 52" King Vertical, 2 swivel heads on rail, p.r.t., m.d.
72" Gisholt Vertical, m.d., d.e. elec. equip., p.r.t.
30" Bullard Vertical, 1 head.
30" Gisholt Vertical, 1 head, p.r.t.
36", 42" Bullard Rapid Production, 2 heads on rail.
36" Colburn Vertical, 2 heads.
37" Niles Vertical, 2 heads, m.d.
51" Niles-Bement-Pond Vertical, m.d. through gear box.
2½" bar Cleveland Horizontal.

PUNCHES AND SHEARS

Hilles & Jones Style J Single End 30" Open Throat H.D. Punch, m.d. with 30 H.P. A.C. motor, capacity 4" hole through 1½" steel. Speed 22 strokes per minute, has 3" stroke. Very late type; practically new.
Cleveland EF Double End Punch and Shear, semi-steel frame, 1¼" through 1", shear 1" plate, 48" throat both ends, m.d.
No. 2 Badger State Alligator Shear, belt drive.
No. 24 Buffalo Armor Plate Slitting Shear, m.d.
No. 465 Bliss Power Gap Squaring Shear, 18" gap, cap. ¼" material 8' long.
No. 4120 Stoll Power Squaring Shear, m.d., cap. 10' by 3/16".

ROLLS

No. 0-62" Hilles & Jones Plate Straightening Rolls, m.d., with A.C. motor, cap. 3/16" material.
74" Bertsch Bending Rolls, belt drive, cap. 5/16".
90" Bertsch Bending Rolls, belt drive, cap. 10 ga.
12' Niles Pyramid Type Bending Rolls, belt drive, cap. 1½".
20' Niles Shipyard Type Bending Rolls, pyramid strong back type, steam engine drive, cap. 1" plate, weight 154,000 lbs.

GEAR MACHINERY

11", 18" Gleason Straight Tooth Bevel Gear Generators, belt.
12" Gleason Bevel Gear Planer, belt.
No. 3, 12 Barber-Colman Gear Hobbers, b.d.
No. 12 Barber-Colman Double Overarm Gear Hobber, m.d.
No. 3-26" Brown & Sharpe Gear Cutter, belt.
No. 3-36" Brown & Sharpe Gear Cutter, belt.
No. 5A Lees-Bradner Gear Generator, belt.
No. 3-26" Cincinnati Spur Gear Cutter, belt.
No. 6 Fellows Gear Shaper, belt.
No. 18 HM 2 spindle Gould & Eberhardt Gear Hobber, m.d.
Hercules Gear Hobber, belt.
Schuehardt & Schutte Gear Tooth Rounder, belt.
12" Ingle Gear Tooth Rounder, belt.
Gleason Cutter Grinder, belt.

LATHES

No. 5 Center Drive Niles Car Wheel Lathe, m.d., A.C. motors, capacity 42"x96".
42"x20' Putnam Geared Head, m.d.
36"x29' Johnson, cone.
36"x11' American, cone.
30"x14' Lodge & Shipley Patent Head, s.p.d.
30"x14' Lodge & Shipley, cone.
30"x11' American, cone.
25" raised to 32"x12' LeBlond, cone.
24"x12' Schumacher-Boye, cone.
24"x12' LeBlond, cone.
24"x10' Boye & Emmes, cone.
24"x10' Greaves-Klusman, cone.
24"x10' American, cone.
24"x 8' Hendey Yoke Head, cone,
22"x10' Lodge & Shipley Selec. Hd., m.d.
20"x12' Lodge & Shipley Patent Head, s.p.d.
20"x10' Hendey Yoke Head, cone.
20"x10' Hendey Geared Head, m.d.
20"x10' Boye & Emmes, cone.
20"x 6' Hendey Geared Head, m.d.
18"x10' Lodge & Shipley Patent Head, m.d.
18"x 8' Schumacher-Boye, cone, taper.
18"x 8' Lodge & Shipley Selec. Hd., s.p.d.
18"x 8' Greaves-Klusman, cone.
17"x 8' LeBlond, cone.
16"x14' Lodge & Shipley Selec. Hd., m.d., taper.
16"x12' Prentice Geared Head, s.p.d.
16"x10' LeBlond, cone, taper.
16"x 6' Hendey Yoke Head, cone, taper.
16"x 6' Hendey Geared Head, m.d.
14"x 6' Hendey Geared Head, taper.
11"x 4' South Bend, m.d., bench type.

RADIAL DRILLS

3', 4' Fosdick, gear box.
3' American Triple Purpose, m.d. on arm.
3' Mueller, gear box.
2½', 3', 3½' Carlton Sensitive B.B.
4' Hammond Jack Knife Sensitive.
4' Morris Plain, gear box.
5' American Triple Geared Plain, gear box.
5' American Triple Geared Plain, d.e. on base.
5' Cincinnati Bickford Universal, m.d.
6' Dreses Full Universal, m.d.
7' Fosdick Plain, Cone.

More than 1500 machines in stock. Send us your inquiries.

THE EASTERN MACHINERY CO.
1002 TENNESSEE AVE., CINCINNATI, OHIO.

CONSIDER GOOD USED EQUIPMENT FIRST

IMMEDIATE DELIVERY IS AN IMPORTANT FACTOR TODAY

AIR COMPRESSORS

300 cu. ft. 10"x5"x10" Chicago Pneumatic Class OCB Belt Driven. 110-115 lbs. Air Pressure
529 cu. ft. 14"x12" Chicago Pneumatic Class NSBE Motor Driven. 100 lbs. Air Pressure
1460 cu. ft. 14"x14"x12"x16" Bury Class VCCE Motor Driven. Suitable for 100 lb. Air Pressure

BALERS

Logemann Hydraulic, arranged for geared motor drive. Complete with horizontal 3 plunger 2 stage hydraulic pump. Size of Bale 7"x7"x14"
Logemann Hydraulic, arranged for geared motor drive. Complete with vertical single acting triplex pump. Size of Bale 4"x4"x11"
200 ton Watson Stillman Hydraulic, Motor Drive. Complete with Logemann horizontal 3 plunger hydraulic pump. Size of Bale 20"x10"x6"

BENDING ROLLS—PYRAMID TYPE

7'2" Hilles & Jones, Motor Driven. Top Roll 13" dia. Botton Rolls 10½" dia. Capacity ¾" Plate
10' McCabe, Motor Driven. Top Roll 10½" dia. Bottom Rolls 8¼" dia. Capacity ⅛" Plate
20' Wickes, Motor Driven. Top Roll 20" dia. Bottom Rolls 14" dia. Capacity ¾" Plate
25'6" Niles, Arranged for Motor Drive. Top Roll 24⅞" dia. Bottom Rolls 18" dia. Capacity 1"
26' Williamette, Motor Driven. Top Roll 28" dia. Bottom Rolls 20" dia. Capacity 1" Plate
30' Southwark, Motor Driven. Top Roll 36" dia. Bottom Rolls 23" dia. Capacity 1⅛" Plate

DRAW BENCH

20,000 lb. Brightman Chain Draw Bench, Arranged for Motor Drive. Length of travel for grip about 22'. Length of bench overall 33'6"

PRESSES

No. 94½ C Toledo Straight Side, 6" Stroke. Distance between uprights 48"
No. 424 Hamilton Straight Side, 9" Stroke. Distance between uprights 42"
800 ton Hamilton Straight Side, 8" Stroke. Distance between uprights 40"
No. 268¼ Toledo Toggle Drawing, Stroke of Blankholder 15½", Stroke of Punch Slide 28"; Bolster Plate 60½"x84"
No. 796¼ Toledo Toggle Drawing, Stroke of Blankholder 21⅝", Stroke of Punch Slide 33"; Bolster Plate 60"x108"

SAW

52" Ryerson High Speed Friction Saw, Hydraulic Feed, Motor Driven. Work Table 24"x36"

CRANES—A.C.

OVERHEAD ELECTRIC TRAVELING

3 ton P. & H.,	29'6"	span, Motors 220/3/60
15 ton Whiting,	45'	span, Motors 220/3/60
10 ton Whiting,	47'10"	span, Motors 220/3/60
50 ton Shaw	46'8"	span, Motors 440/3/60
7½ ton Bedford,	50'	span, Motors 220/3/60
15 ton Bedford,	50'	span, Motors 220/3/60
20 ton	50'	span, Motors 220/3/60
20 ton P. & H.,	50'	span, Motors 220/3/60
15 ton Champion,	57'	span, Motors 440/3/60

CRANES—D.C.

35 ton Northern,	28'	span, Motors 220 volt	DC
30 ton Niles,	34'8"	span, Motors 220 volt with two hoisting hooks	DC
5 ton P. & H.,	37'9"	span, Motors 220 volt	DC
7½ ton P. & H.,	38'6"	span, Motors 220 volt	DC
5 ton Shaw,	40'	span, Motors 110 volt	DC
25 ton Niles,	40'	span, Motors 220 volt	DC
10 ton Morgan,	42'	span, Motors 220 volt	DC
15 ton Whiting,	45'	span, Motors 220 volt	DC
10 ton Morgan,	48'4"	span, Motors 220 volt	
15 ton Shepard,	50'	span, Motors 220 volt	
5 ton Alliance,	50'	span, Motors 220 volt	
15 ton Bedford,	50'	span, Motors 220 volt	DC
25 ton Morgan,	50'	span, Motors 220 volt	DC
20 ton Shaw,	55'	span, Motors 110 volt	DC
10 ton Cleveland,	58'2"	span, Motors 220 volt with two 5 ton Trolleys	DC
15 ton Morgan,	60'	span, Motors 220 volt	DC
10 ton Cleveland,	58'3"	span, Motors 220 volt with two 5 ton Trolleys	DC
25 ton Morgan,	65'	span, Motors 230 volt 500' outdoor runway	DC
25 ton Morgan,	65'	span, Motors 220 volt with smaller auxiliary hoist	DC
25 ton P. & H.,	65'	span, Motors 220 volt with 5 ton auxiliary hoist	DC
20 ton Shaw (2),	66'11"	span, Motors 220 volt with or without runway	DC
10 ton P. & H.,	70'	span, Motors 220 volt with 3 ton auxiliary hoist	DC
40 ton Niles,	71'11"	span, Motors 220 volt with 5 ton auxiliary hoist	DC
5 ton P. & H.,	77'	span, Motors 230 volt	DC

FORGING MACHINES

2½", 4", 5" Ajax, New Model Machines
2", 3", 5" National, Steel Frame
7" Ajax, Steel Frame

PRESS—HYDRAULIC

1200 ton Southwark Four Column, 48"x60" between columns. Slip Ring Motor Drive direct connected to Triplex Hydraulic Pump. Complete with Intensifier. High Pressure Piping and Valves

ROLLING MILL EQUIPMENT

4"x5" Torrington Single Stand. Two High Cold Rolling Mill, Motor Driven
8¼"x10" Belgian Three Stand, Two High Train Cold Rolling Mill, Arranged for Motor Drive
9"x10" Columbia Two Stand, Two & Three High Rolling Mill, Arranged for Motor Drive
9"x14" Cramp Single Stand, Two High Rolling Mill
9"x14" Columbia Two Stand, Two & Three High Rolling Mill, Arranged for Motor Drive
14"x24" Hill Clutch Co. Two Stand, Two High Cold Strip Mill, Arranged for Motor Drive
15"x38" Waterbury Farrel Single Stand, Three High Rod Mill, Motor Driven. Capacity Round Bars 1⅝" dia. down to ⅜" dia.
20"x36" Birmingham Two Stand, Two High Sheet Mill

SHEARS—ALLIGATOR

No. F-6 United Engr. & Fdry. Co. High Knife, Motor Driven. Capacity 5" Square
No. F-7 United Engr. & Fdry. Co. High Knife, Motor Driven. Capacity 6½" Square

SHEARS—GUILLOTINE TYPE

Garrison Bar Shear, Arranged for Motor Drive, Length of Blade 19 1/16". Capacity 5" Rounds
Fisher Fdry. Co. Bar Shear, Arranged for Motor Drive. Length Blade 22". Capacity ¾" thick by 15" wide hot steel

SHEARS—SQUARING

72" Long & Allstatter, Arranged for Motor Drive. Capacity 14 ga. Spring Holddowns
96" Bertsch, Arranged for Motor Drive. Capacity 10 ga. Spring Holddowns
126" Stoll, Belt Driven. Capacity 10 gauge Spring Holddowns

SHEAR—ROTARY

Bliss, Belt Driven. Capacity ¼" Plate
No. 6 Quickwork. Motor Driven. 48" Throat, Capacity ¾" Plate

SLITTER

G-36 Yoder. Motor Driven. Equipped with automatic counting attachments and complete sets of slitting knives

RITTERBUSH & COMPANY, INC., 30 CHURCH ST., NEW YORK, N. Y.
Telephone COrtland 7-3437-3438

BORING MILLS

1—No. 1 and No. 2 Barrett Horizontal
1—6" Espen Lucas Horizontal
1—12' Niles Vertical, M.D.
1—10-16' Betts Vertical, M.D.
1—84" Bullard Vertical
1—72" N-B-Pond Vertical
1—62" N-B-Pond Vertical
1—53" N-B-Pond Vertical
1—60" Colburn Vertical
1—60" Cincinnati Vertical
1—48" Colburn Vertical
1—36" Bullard Rapid Production

LATHES

1—109" x 50' N-B-Pond, M.D.
1—65" x 32' Bement-Miles Heavy Duty
1—36" x 26' Lodge & Shipley
1—30" x 16' Houston-S-Gambel
1—26" x 20' Sidney, Geared Head

PLANERS

1—84" x 84" x 18' N-B-Pond, M.D.
1—72" x 72" x 12' N-B-Pond, M.D.
1—48" x 48" x 16' Cincinnati, M.D.
1—42" x 42" x 22' Cincinnati, M.D.
1—36" x 36" x 14' Gray, M.D.

GEAR CUTTERS

1—72" Cincinnati type G Cutter
1—100" Gould & Eberhardt Hobber

GRINDERS

1—40" x 20' Landis Heavy Duty Plain
1—No. 24 Gardner Disc
1—18" x 84" Landis Plain

MILLERS

1—No. 3 and No. 4 Cincinnati Plain
1—No. 5 Cincinnati Plain

SHAPERS

1— 6" Pratt & Whitney Vertical
1—24" Gould & Eberhardt, S.P.D.
1—24" American, M.D.
1—28" Columbia Heavy Duty

HAMMERS—ROLLS

1—5N Nazel Air Hammer
1—40" x 1" Southwark Bending Rolls, M.D.

SIMMONS MACHINE TOOL CORP.
ALBANY, N. Y. New York City, 149 Broadway
(Write for our latest stock list)

UNUSUAL TOOLS

Our location in Detroit keeps our Organization in constant touch with the largest selection of machine tools in the world.

AUTOMATICS, Gridley 2¼" Mtple. Spindle (7)
AUTOMATICS, Cone 1¼" M.D.
FURNACE, Homo Electric
GRINDERS, No. 13 B. & S. Univ. (3)
GRINDER, No. 2 Cincinnati Univ.
GRINDER, Pratt & Whitney, Surface, Ball Brg., M.D.
GRINDER, No. 70 Heald, Internal
GRINDER, No. 70 Heald Duplex, Double Spindle
GRINDERS, No. 72 Heald, M.D. Hyd. Feed (3)
GRINDER, Gardner Opposed Type, Auto. Feed, M.D.
HOBBER, No. 16HS Gould & Eberhardt, S.P.D.
LATHES, Sundstrand Stub 8" M.D. (4)
LATHE, 30"x10' Reed, M.D.
MILLS No. 2 & 3 Brown & Sharpe Vert. M.D.
MILL, 2½" Cleveland Boring, B.M.D.
MILL, No. 3GH Hendey Univ., S.P.D.
OIL GROOVER, Wicase, late type
PLANER, 60"x60"x14' Niles-Bement-Pond
PLANER, 30"x30"x10' Liberty Openside, Motor drive with motor, 1 rail head and 1 side head
DIE FILER—Theil No. 3 M.D.
SHAPER, 20" G. & E., S.P.D., V.M.D.
SHEAR, 10', ½" United Eng'g. M.D.
SHEAR, 10', ⅜" Pittsburgh, M.D.
SLOTTER, 16" Betts, M.D., like new, latest type
WELDERS, Spot, Seam, Butt

And a complete stock of up-to-date rebuilt equipment.

HARVEY GOLDMAN & CO.
Machinery
10567 Gratiot Ave., Detroit, Mich.

AUTOMATICS

For Immediate Delivery

Cleveland 4½" Model "M" 4-Spindle Chucking Machine, M.D. by 10 H.P. 3-60-220.

Cleveland 4-Spindle 1½" Chucking Machine, M.D.

National-Acme No. 56 2¼" 4-Spindle.

Gridley 4-Spindle 4½" Automatic Chucking Machine, Model "H", M.D.

1¾" Gridley 4-Spindle, Model "F".

2¼" Gridley Single Spindle, M.D.

No. 6-A & 5-A Potter & Johnston's.

14" Fay Automatics with back angle attachment.

Many other high grade machines.

INDUSTRIAL MACHINERY COMPANY
2100-2300 Fletcher Ave., Indianapolis, Ind.
Drexel 3300.

Planers, Milling Machines
Drill Presses, Grinders
Shapers, Lathes, Boring Mills
Monarch Machinery Co.
325 No. 3rd St., Phila., Pa.
All Monarch Machine Tools Are Sold on Approval

26" x 120"
LANDIS GRINDER

Self Contained — Motor Drive

ROSENKRANZ WEISBECKER & CO., INC.
149 BROADWAY, N. Y. C.

42"x30" Bridgeford Grd. Hd. Lathe, M.D.
No. 9 Buffalo Bar Shear, 3" Cap., M.D.
42" & 48" Aetna Std. Sheet Levelers, M.D.
48" Ryerson Friction Saw, M.D., 220/3/60
5-ton Case Crane, 65'3" span, 220 V., D.C.
6x6x⅜" Dbl. Angle Shear, M.D.
93B Toledo D.C. Press, S.D.
28"x54" Farrel Roll Grinder, M.D.
42" King Boring Mill, 2 hds., M.D.
60" Colburn & 52" Betts Bor. Mills, S.D.

WEST PENN MACHINERY CO.
1210 House Bldg., Pittsburgh, Pa.

THE CLEARING HOUSE

GRINDERS

No. 2 Cincinnati centerless
Nos. 70, 72, 72-A-3, 75 Heald internal
No. 12 Bryant internal
26", No. 16 Blanchard surface
12"x24" & 16"x48" Diamond surface
30"x72" Springfield surface
Landis, 6"x18" to 16"x72"
Norton, 6"x32" to 14"x72"
30"x84" Diamond face
No. 4 Brown & Sharpe universal

BORING MILLS

100" Betts
60" Gisholt
42" Detrick & Harvey
34" Colburn, single turret
30" Bullard, single turret
24" Bullard with side head
2½" Cleveland horizontal
3" Binsee, knee type horizontal

PLANERS

24"x24"x 6' Liberty openside
24"x24"x24" Cincinnati crank
27"x27"x 6' Smith Silk
30"x30"x12' Cleveland openside
32"x32"x12' Niles
36"x36"x 8' Gray
36"x36"x10' Cincinnati
36"x36"x12' Gray
36"x36"x16' Cleveland openside
48"x36"x10' Liberty openside

PRESSES

150 ton Ferracute coining
600 ton Cleveland coining
No. 266 Consolidated cam drawing
No. DDG54 Ferracute cam drawing
Nos. 1½ & 5A Bliss toggle drawing
Nos. 55, 56 & 56½ Toledo straight side

WELDERS

175 amp. Westinghouse arc
300 amp. Lincoln arc
100 KVA Thompson Gibb spot, MD.
47 KVA Taylor spot
35 KW National spot
20 KW Federal spot

2000 tools in stock. Send for list.

MILES
MACHINERY COMPANY
SAGINAW, W. S.
MICHIGAN

HIGH GRADE MACHINE TOOLS

LATHES
20"x10' American Grd. Hd., S.P.D.
36"x14' Boye & Emmes, Quick change Cone Drive, New.
24"x10' Hendey Geared Hd., S.P.D.
24"x10' Bradford Geared Hd., Arr. M.D.
2—36"x30' Lodge & Shipley Selective Geared Head, S.P.D. Two carriages. Like New.
30"x18' Lodge & Shipley Lathe, 3 S.C.D., D.B.G.
20"x10' American Grd. Hd., S.P.D.

GRINDERS
16"x72" Landis Plain, Self Cont.
16"x48" and 72" Landis Crankshaft.
Nos. 50, 55, 60, 65 and 70 Healds.

GEAR CUTTERS
No. 6—60" Brown & Sharpe Gear Cutter.
No. 615 Fellows. 24-H G. & E. Hobber.
18-H Gould & Eberhardt Hobber.
6', 11', 16" Gleason Gear Generators.

BOLT AND PIPE THREADERS
2" Acme Class A Bolt Cutter.
6" Landis Pipe Machine, cone drive.
2" Landis Pipe Machine, cone drive.
1" double spindle Landis Bolt Cutter.
18" Landis Pipe Threader.

BORING MILLS
44" Niles, two heads.
24", 36" & 42" Bullard "New Era" A.C. Motor dr.
60" Niles Boring Mill, 2 heads.

MILLING MACHINES
No. 2 Rockford Universal, complete.
No. 4 Cincinnati Pl. Hi-Power, S.P.D.
No. 5A Brown & Sharpe Univ., S.P.D.
No. 5B Becker Vertical Miller.
No. 4 Cincinnati Univ., S.P.D.
No. 3 Cincinnati High Power Plain, S.P.D.
No. 2 LeBlond H.D. Univ. complete.
No. 3 Kempsmith Universal.

PLANERS
42"x42"x10' Cleveland Open A.C., M.D.
26"x26"x 8' Cleveland Openside.
36"x36"x10' Gray, 2 Hds.

RADIAL AND UPRIGHT DRILLS
2½, 3, 3½, 6' Cinci-Bick., S.P.D.
5'—6' arm American Triple Purpose, S.P.D.
6' arm American Triple Purpose, S.P.D.
4' Heavy Duty Fosdick, S.P.D.

SHAPERS
16", 20", 24" G.&E., mtr. dr. thru g.b.

Write for Complete Catalog. We Buy, Sell & Exchange

CINCINNATI MACHINERY & SUPPLY CO.
28 West Second St. Cincinnati, Ohio

---

600 TON TOLEDO KNUCKLE JOINT EMBOSSING PRESS.
MULTIPLE PUNCH: Long & Allstatter, 350 ton Cap. 10 ft. between housings.
DOUBLE ANGLE SHEARS: Kling 6"x6" x1"; 8"x8"x1".
PLATE PLANER: Hilles & Jones No. 4.
BULLDOZERS: Nos. 1, 2, 3, 4, 23, 25 and 26, also No. 24 Vertical Williams White.
UPSETTING and FORGING MACHINES: ¾" to 5".
5000 LB. ERIE DOUBLE FRAME FORGING HAMMER
NAZEL HAMMERS: Nos. 3B and 4B.
BUFFALO BAR SHEAR, No. 8 for rounds, flats, and structural shapes.
H & J STRAIGHTENING ROLLS: ¼" x 4 ft.
400 TON WHEEL PRESS
PRESSES: Solid Back and Incl. Nos. 1, 2, 3, and 4. Also Trimming Presses.
TENSILE TESTERS: 20,000, 40,000 and 200,000 lbs.
WIRE STRAIGHTENERS: ¼" to ⅝".
THREADING MACHINES: ⅜" to 3", Single and Double Spindle, Lead Screws.
LANDIS 6" Pipe Threader, M.D.
D & K BENDING BRAKES: 10' x 3/16" and 10' x 16 ga. pan.
NIAGARA SHEAR: 10' x 18 ga.
YODER SLITTER: 36" x 16 ga.
AIR COMPRESSORS and SAND-BLASTS
HEAT TREATING FURNACES: Homo, American Gas, S.C. & H. Rotary and Pusher Type.
BOLT, NUT and RIVET MACHINES: Cold and Hot Headers; Cold and Hot Nut Machines; Threaders; Trimmers; Thread Rollers; Slotters; Stud Threaders; Tappers; Burring Machines; etc.

DONAHUE STEEL PRODUCTS CO.
74th St. & Ashland Ave. Chicago, Ill.

BORING MILL

(POST TYPE—DOUBLE COLUMN.)

6" Spindles N-B-P, floor plate 26'x10', Also separate Milling Attachment, three motors of 220 V. DC. Weight 40 Tons. Excellent condition—Immediate shipment.

TRIPLE COMB. PUNCHES & SHEARS

Pels No. 16-sp. Capacity 1 1/16"x⅝", high gap with triple sag punch att., for MD.
Buffalo, No. 25Ux24", cap. 1"x⅝", for MD.

ANGLE SHEAR

6"x6"x¾" Kling Double Shaft, on turntable, MD.

MARR-GALBREATH MACHINERY CO.
55 Water Street, PITTSBURGH, PA.

#16 Blanchard Vertical Surface Grinder, 20 HP, 60 cycle motor on spindle.
16" Gould & Eberhardt Shaper, cone drive
24" Gould & Eberhardt Shaper, gear box AC drive.
26" Lynd-Farquhar Openside Shaper, MD
48" Bement Rotary Planer, MD
16" x 8' Hendey Geared Head Lathe, TA
#1 Kempsmith Universal Miller, full equipment
#3 Thiel Filing and Sawing Machine
60" Niles Roller Leveller.

BUFFALO MACHINERY CO., INC.
839 Grant Street Buffalo, N. Y.

BROWN & SHARPE GEAR CUTTER No. 5—60"
DIAMOND SURFACE GRINDER 16 x 50 BELT DRIVEN.
GARDNER No. 24 HORIZONTAL DISC GRINDER 53".
BROWN & SHARPE No. 2-B PLAIN MILLER—BELTED MOTOR DRIVE.
CINCINNATI PLAIN MILLERS—No. 2 and 3 CONE DRIVE
AVEY BALL BEARING DRILLS—2 and 3 spdle No. 2 Taper.
CINCINNATI AUTOMATIC MILLER—24".

INDIANAPOLIS MACHINERY & SUPPLY CO., INC.
1959-69 South Meridian Street, Indianapolis, Indiana

REBUILT—GUARANTEED

No. 4G LeBlond Plain Miller, G.H., S.P.D.
No. 3 LeBlond Plain Miller, cone drive
No. 3 B. & S. Plain Miller, cone drive
No. 3 B. & S. Universal Grinder, belt drive
No. 2 B. & S. Surface Grinder with Magnetic Chuck
16"x48" Landis Crank Shaft Grinder
12"x72" Landis Plain Grinder
21"x12' LeBlond Lathe, cone drive
27"x10' Greaves Klusman Lathe, cone drive
27"x10' American 8 speed Geared Hd., S.P.D.
3' American Radial Drill, Gear Box, S.P.D.
4½' Morris Radial Drill, Gear Box, S.P.D.
24" G. & E. Shaper, cone drive
20" Stockbridge Shaper, cone drive
15" P. & J. Shaper, Universal Table, cone drive
6' and 10' Robinson Press brake

Send for complete stock list

IROQUOIS MACHINERY CO.
656 Ohio Street Buffalo, N. Y.
Phone Washington 1513

No. 8—Buffalo "Armor Plate" Bar Cutter—95% new.
11' Stoll Motor Driven Power Shear—capacity 14 Ga.
24" x 12' Lodge & Shipley Crank—Shaft Lathe.
30" x 30" x 10' Cleveland Open Side Planer, 3 heads.
48" x 48" x 12' Cleveland Open Side Planer, 2 heads.
Ingersoll Miller, 56" x 36" x 10', 4 heads.
No. 5-A Lees-Bradner Gear Generator.
No. ½—Buffalo "Universal" Iron Worker.

THE E. L. ESSLEY MACHINERY CO.
829 Rees Street, Chicago, Ill.

10' x 7' x 18'
BETTS PLANER

Rapid Traverse—Four Heads—Late Type

ROSENKRANZ WEISBECKER & CO., INC.
140 BROADWAY, N. Y. C.

FOR SALE

GARDNER 53" VERTICAL SPINDLE GRINDER for belt drive. Equipped with Wire-Lokt disc 90% of original thickness. Machine in good condition.

ADDRESS BOX S-312
Care *The Iron Age*, 239 W. 39th St., New York

UNIV. MILLER

No. 2 Brown & Sharpe, cone drive, table w.s. 45"x11⅛", standardized spindle nose, regular equipment.

THE O'BRIEN MACHINERY CO.
113 N. THIRD ST., PHILA., PA.

HONING MACHINE

Brand new Hutto Vertical Heavy Duty Hydraulic, Model 1-VH-1024, having a capacity up to 10" in diameter by 24" stroke length. Complete in every respect including electrical equipment.

THE FAST BEARING COMPANY
Hampden Avenue and 23rd Street, Baltimore, Md.

GLEASON Semi-Automatic Bevel and Spur Gear Planer, Capacity 80".

ADDRESS BOX S-324
Care *The Iron Age*, 239 W. 39th St., New York

24" Bullard New Era Vertical Boring Mill.
3" Universal Horizontal Boring Mill.
4 sp. Leland-Gifford H.S. Drill, 12" overhang, No. 3 taper, power feed on each spindle.
No. 14 Cochrane-Bly Duplex Universal Vertical Miller and Shaper, rotary table and dividing head.
No. 2 Kempsmith Maximiller, S.P.D.
3' American Motor on Arm Radial Drill.
16"x12' Sidney Geared Head M.D. Lathe, T.A. & chucks.

VICTOR MACHINERY COMPANY
Dept. I, 130 So. Clinton Street, Chicago, Illinois

USED EQUIPMENT

1—No. 16 **BLANCHARD** Grinder, 26" chuck, motor 220 V. 3 ph. 60 cy.
1—No. 16 **BLANCHARD** Grinder, 26" chuck, belt drive.
1—14 inch **PRATT & WHITNEY** Vertical Grinder, B.B. Spindle, Magnetic Chuck.
3—**BROWN & SHARPE** No. 2 Y.B. Plain Millers, motor in base, 440 V. 3 phase 60 cycle.
1—**BROWN & SHARPE** Plain Miller, No. 3B Heavy S.P.D.
1—**CINCINNATI** No. 4 Plain Miller with dividing head and vertical head, cone drive, Q.C. feeds.
1—**PRATT & WHITNEY** Threadmiller 4½ x 12.
2—48" **COLBURN** Vert. Boring Mills, 2 heads, S.P.D.
1—**SHUSTER** Wire Straightener, ⅜" x 10' capacity.
3—**ACME** Flat Turret Lathes 3¼" x 36" Bar and Chucking.
1—**LODGE & SHIPLEY** 48" x 18' Screw Cutting Lathe, triple geared face plate, cone driven.
2—25" x 12' Heavy Duty **LE BLOND** Screw Cutting Lathes, cone drive, DBG, QCG.
4—No. 4 **WARNER & SWASEY** Turrets, Wire Feed.
1—**CINCINNATI-BICKFORD** 6 ft. Radial Drill, A.C. Motor Drive through gear box.
1—**REED-PRENTICE** 5' Radial, motor drive, gear box.
1—16" **CINCINNATI** Gear Hobber, SPD.
1—60" x 48" x 12' **NILES BEMENT POND** Planer, 2 Heads, 1 Side Head, Belt or Motor.
10—No. 18S **BLISS** Bench Presses, Roller Clutches.
1—15 Ton **LUCAS** Power Forcing Press.

MORRIS MACHINERY COMPANY, Inc.
99 CHESTNUT STREET
NEWARK, N. J.

---

100 PRACTICALLY NEW

LOSHBOUGH—JORDAN

OPEN BACK INCLINABLE PRESSES
NOS. 1, 2 AND 4

39—No. 1 with 1½" stroke
Weight 1000 lbs.
Bed FB₂RL 3x15"
Ram Pressure 10 tons

42—No. 2 with 2" stroke
19—No 4 with 1½" stroke

All purchased new in 1929 and in excellent condition

Available for immediate shipment

J. N. MOYER
471 North Fifth St., Philadelphia, Pa.

"Anything so long as it contains IRON or STEEL"

IRON & STEEL PRODUCTS, Inc.

BUYERS SELLERS TRADERS
Chicago (Hegewisch Sta.), Illinois
Phone South Chicago 9430

FOR SALE

CAR REPAIR PARTS
CARS and LOCOMOTIVES
30 TON GASOLINE LOCO.
Whitcomb, S.G. 4-wheeled. 1930. Run only 2000 M. Virtually 100% new.
AIR DUMP CARS, S.G.
Three, 10-yd. Western 1927, Steel, in unusually good condition.
Four, 12-yd. Western Wood, fair condition.
Twelve, 20-yd. Western 1920, Steel. Good condition.
Sixteen, 20-yd., Magor 1918, Steel, excellent condition.
Four, 20-yd., Koppel, 1928, Steel, U/T Type, excellent condition.
Also, all other Capacities and Track Gauges.
50-10,000 Gal. Tank Cars, Cheap.
6½-YD.-BUCYRUS ELECTRIC SHOVEL
2—Howe Scales (125 ton, 50 ft.)
1½-ton SWINDELL ELEC. FCE.
Completely Overhauled. Good as New.
BUILDINGS:
Truscon 50'x185'. Complete with steel sheeting, sash and doors. Easily re-erected.
New Shop Bldg. never erected. 445'x730'; five-section for 20-ton Cranes. Will split.
OTHER BUILDINGS, TOO.
CRANES: O. H., GANTRY & LOCO.
NEW G. E.; O. H. CRANE MOTORS
9, 50 HP; 8, 25 HP; 7, 20 HP; 3/60/440. Ball-bearing Slip-ring with Brakes & A-B controls.
Various other Motors, too, both A.C. and D.C.
Send for our latest Machy. & Equip. bulletin

WANTED

STEEL BUILDINGS
ANY SIZE OR LOCATION
CRANES:
O. H., GANTRY & LOCO.
GANTRY CRANE:
70' Span.
ROTARY SNOW PLOWS
CARS and LOCOMOTIVES
CAR REPAIR PARTS
SCRAP: TUNGSTEN BEARING
ELECTRIC FURNACES
BUYERS—SELLERS—TRADERS

PLANER

1 . . . 72" x 56" x 20' Cincinnati planer with two heads on cross rail and one side head. Arranged for reversing motor drive and fitted with one No. 131 type SK 35 H.P., 230 volt, 250 to 1000 RPM reversing planer motor. Cross rail operated with one No. 925 type CD 5 H.P., 230 volt, 1150 RPM motor. Condition perfect. Ready to demonstrate. Price $10,000. FOB Pittsburgh.

KEROTEST MANUFACTURING COMPANY
2525 LIBERTY AVENUE, PITTSBURGH, PENNA.

Belt Cutter, Landis 3-spdl. 1¼" to 1½"
Compressor, Sullivan Angle Compound WJ3, 750 cu. ft., with 150 HP slipring motor
Radial Drill, 4-ft. American SPD
Baker Drill Press 13" overhang, power feed, SPD
Grinder, Heim Centerless Cylindrical
Hammers, board drop, 400-lb. to 1200-lb.
Upsetter or **Header** 3½" National, arr. for motor-dr.
Miller, No. 2 Brown & Sharpe Vertical
Presses, No. 7 Massillon S.S. Geared 6" stroke; No. 55 S.S. Consolidated SBG 6" stroke; No. 19 Cleveland OB 3" stroke.

THE ELYRIA BELTING & MACHINERY CO.
ELYRIA, OHIO

No. 3 CINCINNATI CENTERLESS GRINDER Texrope Drive, Plain bearings, Serial No. H-2029.

No. 2 CINCINNATI ACME TURRET LATHE arranged for chucking, motor drive with motor.

No. 4 BROWN & SHARPE AUTOMATIC SCREW MACHINE arranged for motor in the base. 90% new.

INDUSTRIAL MACHINERY & MOTOR CO.
6420 East Lafayette Avenue
Detroit, Michigan

"FOR SALE"

4—No. 165 McDonald Automatic Strip Feed Presses.

D. E. DONY MACHINERY CO.
47 LAURELTON ROAD ROCHESTER, N. Y.

P. H. CRAWFORD CO.
50 CHURCH ST.—NEW YORK

STEEL MILL EQUIPMENT

---

1 Keller No. E-2 Engraving or Die Sinking Machine, motor driven, like new.
1 Ferracute No. EG-54 Knuckle Joint Press, 400 tons pressure.
1 Manville No. 5 Four Slide Wire Former.
1 Henry & Wright 10 tons Dieing Press.

NATIONAL MACHINERY EXCHANGE
"If It's Machinery—We Have It"
128-138 Mott St. New York, N. Y.

WANTED TO SELL:

1—Doelger & Kirsten No. 4 Scrap Shear, for cutting heavy structural sections, bulky materials, rounds, squares, and rails up to 100 lb. 35 H.P. motor with machine. All in good operating condition. 36" knives furnished with machine. Approximate weight of machine—40,000 lb.

ADDRESS BOX S-330
Care *The Iron Age*, 239 W. 39th St., New York

FOR SALE

National Acme Screw Machine
Four Spindle Automatic Machine, 1¾ Capacity, Model F, Serial No. 9132

AMERICAN SAFETY TABLE CO., INC.
8th & Oley Streets, Reading, Pa.

1—George Ohls Press Brake: 10 gauge 10', M.D.
1—Loy-Nawrath Press Brake: 10 gauge 72" with 12" gap, M.D.

BEATTY MACHINE & MANUFACTURING COMPANY
936-150th Street, Hammond, Indiana

ARC WELDERS

200 Lincoln or G. E. A. C. drive
200 Lincoln gas engine drive
300 Lincoln or G. E. A. C. drive
300 Lincoln D. C. drive

Many other welders in stock. All machines overhauled and guaranteed.

GOODMAN ELECTRIC MACHINERY CO.
1060 Broad St., Newark, N. J.

Automatic Can Machinery
Bodymakers—Flangers
Double Seamers—Bliss No. 81
Slitters—Testers

R. & S. MACHINERY CO.
19 Howard St., New York City

POWER PRESSES

BLISS, TOLEDO, V & O, ETC.
REBUILT—GUARANTEED

JOSEPH **HYMAN** & SONS

Nearly new Boiler Shop Roll
Ryerson 8 ft. Motor drive hand adjustment 1/2 capacity, price on request.

J. NUTTALL
2740 N. 5th St., Philadelphia, Pa.

STANDARD MILLING COMPANY
Box 928
Minneapolis, Minn.

MACHINERY FOR SALE

1 Link Belt Ash Handling equipment 350 ft. combination coal and ash handling elevator and conveyor 131 ft. long, 49 ft. rise, 24" link belt chain with 24x18" peck carriers, upper arm carried by 24" high cast iron stands 8 ft. on centers, with 6" angle steel support on bin frame. 20 lb. railroad iron track guides, 3—18"x34' steel spouts to storage. Subject to inspection where is as is
2 Worthington Steam Pumps 7½"x2x6 Hydraulic duplex iron fitted steam pumps each fitted with 1¼" Fisher pump governor. Serial number pumps 209656 and 211578
1 Knowles Steam Pump 7½x4½"x10" brass fitted duplex pump, outside packed with patent valve No. 179606
1 Gardener steam pump 7x4½x10" duplex brass fitted steam boiler feed pump outside packed with patent valve serial No. 56156
1 Worthington steam pump 7½"x4½"x10" duplex brass fitted, outside packed, pot valve pump, shop No. 744266
1 Ingersoll Rand compressor 12"x10"x10" steam end 12x10 air 12x10 Class F.R. single cylinder straight line steam driven air compressor with 3 feed automatic ratchet lubricator, shop No. 24113
1 Synder-Hughes 8"x4½"x10" duplex brass fitted steam pump shop No. 24400 with 1¼" Fisher pump governor
1 Hughes steam pump 7x4x8" duplex brass fitted steam pump shop No. 20871 with ¾" Squires regulating valve
1 Fairbanks Morse Fire pump 18"x10"x12" underwriters labeled steam driven pump No. 6096—1000 gal. per minute
1 National Air Compressor type No. 6 2 cylinder No. 32861 direct connected to 7½ h.p. Westinghouse induction motor type C.C.L. 3 phase 60 cycle 440 volt 1150 r.p.m. No. 1070488 with automatic electric type A Governor No. 1453.

READY FOR IMMEDIATE SHIPMENT

1—100 K.W. General Electric 250 Volt D.C. motor generator, 3 bearing unit on cast iron base, 900 R.P.M.

1—100 K.W. General Electric 125 Volt D.C. motor generator, 3 bearing unit on cast iron base synchronous motor, 1200 R.P.M.

1—150 HP. General Electric Slipring Type 1—3 ph. 60 cycle 220 volt—720 R.P.M.

1—125 H.P. Allis-Chalmers Type AR 226 3 ph. 60 cycle, 2200 volt—1800 R.P.M.

1—100 HP. General Electric Type KT 356 3 ph. 60 cycle—900 R.P.M.

ARC WELDERS

1—500 Amp. Multiple Operator Westinghouse factory built Arc Welder driven by A. C. Motor with complete control equipment and panel board.

1—100 Amp. Hobart factory built Portable Arc Welder—Driven by A. C. motor with complete control and panel board.

L. J. LAND—Est. 1910
140 GRAND STREET, NEW YORK, N. Y.
New York City's Largest Stock

GUARANTEED REBUILTS

Specials from Chicago's largest, most complete stock of guaranteed rebuilt equipment

MOTORS
1—1000 hp. Cr. Wheel. Syn. 600 rpm.
1— 750 hp. El. Machy. Syn. 514 rpm.
1— 500 hp. Al. Chalm. Slipr'g 450 rpm.
1— 300 hp. G. E. squir. cge. 360 rpm.
1— 200 hp. G. E. squir. cge. 720 rpm.
1— 200 hp. Westghse. squir. cge. 1200 rpm.
1— 100 hp. G. E. vert. slipr'g 900 rpm.

MG SETS
2—750 KW. Westghse. Syn. 125/175 V.
1—200 KW. Cr. Wheel. Syn.
Many others—all capacities

ALTERNATORS
1—1250 KW. Ideal 1200 rpm.
1—1250 KVA. G. E. 257 rpm.
1— 750 KVA. Cr. Wheel. 600 rpm.
1— 500 KVA. El. Machy. 514 rpm.
1— 300 KW. G. E. 225 rpm.

TURBO GENERATORS
2—1250 KVA. G. E. condensing
Many others—various capacities

TRANSFORMERS
3—150 KVA. Westghse.—2300-440 V.
3—100 KVA. Maloney—12000-460 V.

DC GENERATORS
1—250 KW. Westghse. 600 rpm.

WELDERS
1—1000 Amp. General Electric
1— 500 Amp. Westinghouse

COMPRESSORS
1—1220 CFM. Bury..185 rpm.
1—1100 CFM. Bury..150 rpm.
1— 340 CFM. Sullivan 260 rpm.

Send for New 56-page catalog Motors, M-G Sets, Generators, Pumps, Blowers, Platers, Welders, etc.

CHICAGO ELECTRIC CO.
1322 W. 22nd. CHICAGO, ILL.

ADJUSTABLE SPEED MOTORS-230 V. D. C.

H.P.	MAKE	TYPE	SPEED
1—600	Westinghouse		400/600
1—400	General Electric	DMC	600/750
1—400	General Electric	MPC	160/300
2—200	General Electric	DMC	300/600
2—100/150	General Electric	DMC	150/300
8—120	General Electric		300/900
1—100	Reliance	T	400/1200
5— 60	El. Dy.	25-S	525/1050
6—40/50	Crocker Wheeler	EM	175/700
2— 35	General Electric	LC	400/1000
2— 35	Westinghouse	SK	500/1500
17— 25	General Electric	LC	650/1950
1— 20	Westinghouse	SK-130	375/1500
8— 10	Westinghouse	SK-90	500/1500
36— 7½	Westinghouse	SK-70	500/1500

BELYEA COMPANY
Incorporated
147 West 18th St., New York City

SURPLUS MACHINERY AND MOTORS

H.P.	Speed	Volts	Make	Price
2—400 3 ph.	60 cy. 500	2200	Westinghouse	$800
1—450 3 ph.	60 cy. 514	550	G.E. S.R.	950
5—15 D. C.	500/1000	550	G.E.	290
2—20 D. C.	500/1000	550	G.E.	340

1—Rock River Punch 48" Throat, Architectural Jaw. Price 850
1—50-Ton Industrial Bay City Wreck Crane 4,500
1—20-Ton Browning Loco. Crane..... 4,000
1—25-Ton Industrial Bay City Loco. Crane 5,000
1—20-Ton McMyler Loco. Crane..... 4,000
1—15-Ton Browning Loco. Crane..... 3,500

NOW IN OPERATION—A-1 CONDITION
1—15-Ton Morgan Crane 80'0" Span
1—10-Ton Niles Crane 80'0" Span

HUNTER STEEL COMPANY
3200 Grand Avenue, Neville Island — Phone Federal 4300, Pittsburgh, Penna.

SHEET STEEL

New, Soft, Prime Sheets Located in Philadelphia and in transit

H.R.P. & O.

11 GA.—	36 x 96	8,500
11 "	36 x 120	10,000
11 "	40 x 96	11,100
11 "	48 x 96	17,200
11 "	48 x 120	10,300
14 "	36 x 96	10,500
14 "	36 x 120	10,400
14 "	48 x 96	15,800
14 "	48 x 120	12,800
16 "	36 x 96	10,200
16 "	36 x 120	10,300
16 "	38 x 108	3,700
16 "	40 x 96	15,300
16 "	44 x 96	15,800
16 "	48 x 96	15,100
16 "	48 x 105	10,800
16 "	48 x 120	10,400

C.R.PRIME, Soft, Oiled

16 GA.—	36 x 120	10,300
16 "	36 x 96	10,100
16 "	40 x 96	10,200
16 "	48 x 96	15,500
16 "	48 x 108	10,200
16 "	48 x 120	22,800
22 "	36 x 96	16,000
22 "	36 x 120	16,000
22 "	48 x 120	8,000

We stock primes, excess and seconds.

A. M. WOOD & COMPANY, INC.,
22nd & Westmoreland Sts.
Philadelphia, Pa.

MODERN
AIR COMPRESSORS
All Types and Sizes
Rebuilt-Guaranteed
EARL E. KNOX COMPANY
8 West Second St. Erie, Pa.

FOR SALE CHEAP—Two New 1½ KW Moon Type 4C Steam Turbine Generators. Guaranteed A-1 condition. Bargain to quick buyer. Prichard Supply Co., Mannington, W. Va.

AIR COMPRESSORS IN STOCK

2600 ft. Sullivan WN4 Duplex Electric.
807 ft. Ingersoll-Rand XCB, Belted.
676 ft. Ingersoll-Rand XCB, Belted.
540 ft. Ingersoll-Rand ERi, Belted.
9 Low Pres. 168 ft., 710 ft., 1200 ft.
2200 ft. Steam, Belted & Elec. Drives.

R. C. STANHOPE, INC.
875 Sixth Ave. New York, N. Y.

Guaranteed PERFORMANCE TESTED
MOTORS

Buy Moreco performance tested motors, generators, transformers. Completely rebuilt, modernized, and sold under a money back guarantee. Send your inquiries. 6000 units in stock.
THE MOTOR REPAIR & MFG. CO.
1553 Hamilton Ave. Cleveland, O.

AIR COMPRESSORS

New and Remanufactured
Compressor Builders for 35 Years
In Stock at Our Plant—150 Modern Compressors
All Makes and Sizes—Shop Tested—Guaranteed
AMERICAN AIR COMPRESSOR CORP.
558 Hamilton Avenue, Brooklyn, New York

ELECTRIC HOISTS — CRANES

Bought — Sold — Rented
ELECTRIC HOIST & MOTOR CO.
149 N. 9th ST. BROOKLYN, N. Y.

OVERHEAD CRANES & HOISTS

2—20-ton Shaw Cranes, 3-motor, 67'0" span, 220 vo. D.C.
1—15-ton Shaw Crane, 4-motor, 47'0" span, 220 vo. D.C.
2—10-ton Milwaukee Cranes, 100'0" span, 3-motor, 220 vo. D.C.
1—7½-ton Morgan Crane, 3-motor, 65'0" span, 220 vo. D.C.
1—5-ton Whiting, 3-motor, 97'0" span, 220 vo. D.C.
1—5-ton Niles Crane, 87'0" span, 3-motor, 220 vo. D.C.
1—5-ton Case Crane, 55'0" span, 3-motor, 220 vo. D.C.
1—3-ton P. & H. Crane, 3-motor, 28'0" span, 220 vo. 3 ph. 60 cy.
— OUTSIDE RUNWAY —
1—Outside Runway, 5 tons, A-fram type, 161-ft. long, 25-ft. high.

Send Me Your Crane & Hoist Inquiries
JAMES P. ARMEL
925 Fulton Bldg. Pittsburgh, Pa.

USED STEAM AND ELECTRICAL EQUIPMENT

Steam Turbines, Motor Generator Sets, Belted and Direct Connected A.C. and D.C. Generating Units, Boilers, Rotary Converters, Motors, Transformers, Etc.
ARCHER & BALDWIN, INC.
75 West Street, New York
Tel.—BOwling Green 9-9275—9276

PRICE RIGHT FOR QUICK SALE

Shepard 10-ton Form 3-6 Hoist, with 15 HP. G.E. 220V. A.C. Motor, with remote control, 2-sheave hooks for four ropes, grooved to handle 34 ft. lift @ 15 FPM, 40 ft. of cable.
SCULLY-JONES & COMPANY
1905 S. Rockwell, Chicago, Ill.

LIFTING MAGNETS

22" 36" 43" 55"
We furnish completely rewound magnets guaranteed one year.
We buy, sell, rent and repair magnets.
GOODMAN ELECTRIC MACHINERY CO.
1060 Broad St. Newark, N. J.

ALBERT & DAVIDSON PIPE CORP.

PIPE

NEW-USED-UNTESTED

2nd Ave. 50th-51st Sts. Est. 1904 Brooklyn, N.Y.

Second Hand Wrought Iron and Steel **PIPE** Overhauled Rethreaded Coupled

All Sizes in Stock

Greenpoint Iron & Pipe Co., Inc.

Stagg & Bogart Sts., Brooklyn, N. Y.

RELAYING RAILS

2,000 tons of 80-lb. ASCE Section Relaying Rails, complete with Angle Bars. Ready for immediate shipment.

M. K. FRANK

480 Lexington Ave., New York City — 450 Fourth Avenue, Pittsburgh, Penna.

RAILS "1 Ton or 1000"

NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—35,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money.
'Phone, Write or Wire.

L. B. FOSTER COMPANY, Inc.

PITTSBURGH NEW YORK CHICAGO

EQUIPMENT

26—12 yd. Western Air or Hand Dump Cars
11—50 ton 40 ft. Flat Cars
8—50 ton 40 ft. Steel Gondolas
22—50 ton Steel Hopper Coal Cars
1—25 ton Browning Locomotive Crane
1—20 ton Ohio Locomotive Crane
2—40 ton Baldwin 4-Driver S.T. Locomotives
12—5 yd. 36" ga. Western Dump Cars
3—1½ yd. 36" ga. Koppel V Dump Cars
Cars and Locomotives of all types.

HYMAN-MICHAELS CO.

20 N. Wacker Drive Bldg., Chicago
Ry. Exchange Bldg., St. Louis, Mo. — 101 West 31st St., New York

---

WANTED

WANTED

18" to 20" geared head lathe, 6' centers
20" to 22" geared head lathe, 8' centers
Boring bar for 16" to 36" Cylinders, 13' to 16' long
3 ton traveling crane, 4 AC motors (for bucket operation), 25' span
10 ton traveling crane, 3 AC motors, 37' span
No. 16 Blanchard surface grinder, AC motor

MILES MACHINERY CO.

Saginaw, Mich.

MIDLAND STEEL & EQUIPMENT CO.
400 South Clinton Street, Chicago, Illinois

The Largest Buyers of Surplus Steel Inventories

WANTED

Your *Inquiries* and *Offerings*

Your perusal of our SPECIAL advertisement on page 141 of the Classified Section.

It may "pay" you to do so!

IRON & STEEL PRODUCTS, INC.

Chicago (Hegewisch Sta.), Illinois
Phone South Chicago 9430
"Anything so long as it contains IRON or STEEL"

WANTED TO BUY

SURPLUS AND OBSOLETE LOTS SHEET STEEL, TINMILL PRODUCTS, STRIP STEEL

ADDRESS BOX S-249

Care *The Iron Age*, 239 W. 39th St., New York

WANT TO BUY:

4 or 8 heavy steel face plate jaws 12" or 14".
2—5 to 7½ H.P. 220-V. DC variable speed motors.
1—Air Compressor about 500 Cu.Ft. 125 lb. pressure with diesel engine or 220-V. AC Motor.

ADDRESS BOX S-322

Care *The Iron Age*, 239 W. 39th St., New York

WRECKING

We will purchase and dismantle any size plant. Also purchase motors, generators and electric equipment of every description.

GEORGE STEINER

1231 West Lake St., Chicago, Ill.

CONTRACT MANUFACTURING

METAL STAMPINGS IN SMALL LOTS

We now have the largest plant in the United States devoted exclusively to the production of metal stampings in small lots. We also have the most modern equipment and do first class short run stampings at the lowest possible price. Prompt service is assured on all releases.

Send Us Your Inquiries

A. L. BOERUM CO.

7115 Charles St., Philadelphia, Pa.

SPECIAL MACHINERY

and parts, made to your drawings in an up-to-date plant; mail blue prints for estimates.

THE FRANKLIN MFG. CO.

P.O. Box 1576, New Haven, Conn.

STAMPINGS

Light and Medium Electric Spot Welding and Assembled Units

We specialize in designing stampings to substitute castings. Dies designed and built for quantity production.

Eastern Tool & Stamping Co., Inc.
39 Ballard Street, Saugus, Mass.

STAMPINGS

We specialize in Metal Stampings, design our own dies for light and medium stock and build same for quantity productions.—Send blue prints or samples for estimate, and let us make your stampings.

NATIONAL MACHINE TOOL COMPANY

RACINE, WISCONSIN

SCREW MACHINE PRODUCTS

OF EVERY DESCRIPTION
SMALLEST UP TO 2¼"
HARDWARE SPECIALTIES

OLSON MFG. CO.
Worcester, Mass.

MANY MANUFACTURERS are looking for new sources of supply for contract work. Place your ad here to get some of this business.

HOT DIP GALVANIZING

We have the largest hot dip galvanizing plant and kettles in the United States. We have the most modern equipment to do first class galvanizing at lowest prices. Prime Western Zinc used exclusively. Galvanized products furnished.

Send Us Your Inquiries

Joseph P. Cattie & Brothers

Gaul and Letterly Streets
Philadelphia

BRASS AND BRONZE CASTINGS
1 lb. to 4000 lbs.
Capacity 16,000 lbs. per day
OUR SPECIALTIES
WORM AND GEAR BRONZE, BRIDGE BRONZE, ACID PROOF BRONZE, BRONZTOX BUSHINGS AND BARS

A. W. CADMAN MFG. CO., Pittsburgh, Pa.
Established 1860

MONEL AND PURE NICKEL

CASTINGS

Superior Bronze Corporation

ERIE, PENNA.

BRASS, BRONZE AND ALUMINUM CASTINGS

Diamite and Moly-iron

Castings

We specialize in Alloy Iron Castings, Finish Grinding and Machine Work.

Weatherly Foundry & Manufacturing Co.

WEATHERLY, PA.

BRAZING—ELECTRIC

ON A COMMERCIAL—JOBBING—PRODUCTION BASIS
In Modern, Controlled-Atmosphere Furnaces

We specialize in intricate parts made-up of castings, stampings and/or screw-machine parts MEPCO brazed into single units.

Send us your prints for quotations

THE METAL ELECTRIC PROCESSING COMPANY
1925 Nebraska Ave., TOLEDO, OHIO

ALLOY IRON CASTINGS
a specialty
CONTRACT MACHINE WORK
requiring large machine tools
MURRAY IRON WORKS COMPANY
BURLINGTON, IOWA

BUSINESS OPPORTUNITIES

Valuable

IRON PROPERTY

Canadian Company has several properties containing valuable metals. Two of these properties, containing Pyrite and Siderite, are partially developed and ready for almost immediate operation. Between 5,000 and 10,000 tons of ore were mined and shipped some years ago. Internal dissension delayed further operation. Company, now reorganized, is open to proposals for leasing, selling or further developing. New refining process, practically completed, will make this property the most valuable iron deposit on North American Continent. Railroad sidings on the property and power line runs through. Correspondence invited with responsible principals.

ADDRESS BOX S-276
Care *The Iron Age,* 239 W. 39th St., New York

Active 40 year old manufacturing and general machine jobbing business for sale. Manufacturers of steel specialties, miscellaneous iron work, general machine and forge shop. 750,000 Population, Southern Ohio.

ADDRESS BOX S-297
Care *The Iron Age,* 239 W. 39th St., New York

Important to Iron & Steel Manufacturers & Iron Ore Mines

Required:—Agencies for Great Britain & the Continent for the above; also Iron & Steel Works Plant, Scrap, etc.

Windsor-Richards, Son & Co., Ltd.
Aldwych House, London, W.C. 2
Cables:—Winardso London. Telephone HOLborn 1656

Procurement Division, Public Buildings Branch, Washington, D. C., Aug. 6, 1937.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Sept. 8, 1937, for construction of the U.S.P.O. at Fayetteville, W. Va. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Assistant Director, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Buildings Branch.

Procurement Division, Public Buildings Branch, Washington, D. C., Aug. 6, 1937.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Sept. 7, 1937, for construction of the U.S.P.O. at Port Washington, Wis. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Assistant Director, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Buildings Branch.

GET IN THE HABIT

of reading and using the classified sections — they are full of opportunities.

Procurement Division, Public Buildings Branch, Washington, D. C., Aug. 6, 1937.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Sept. 9, 1937, for construction of the U.S.P.O. at Wayne, Mich. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Assistant Director, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Buildings Branch.

Procurement Division, Public Buildings Branch, Washington, D. C., Aug. 10, 1937.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Sept. 14, 1937, for construction of the U.S.P.O. at Belleville, Kans. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Assistant Director, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Buildings Branch.

Procurement Division, Public Buildings Branch, Washington, D. C., Aug. 3, 1937.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Sept. 7, 1937, for construction of the U.S.P.O. at Short Hills, N. J. Upon application, one set of drawings and specifications will be supplied free to each General Contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Assistant Director, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Assistant Director of Procurement, Public Buildings Branch.

Circulation Announcement

The latest audited circulation figures on The Iron Age show 14,108 paid subscriptions and 630 copies to advertisers as of June 30, 1937.

EMPLOYMENT EXCHANGE

EMPLOYMENT SERVICE

SALARIED POSITIONS
$2,500 to $25,000

This thoroughly organized advertising service of 27 years' recognized standing and reputation carries on preliminary negotiations for positions of the calibre indicated, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If you have actually earned over $2,500, send only name and address for details.

R. W. BIXBY, Inc.
274 Delward Bldg., Buffalo, N. Y.

HIGH GRADE MEN

Qualified candidates desiring salaried positions are invited to use our individual and confidential services in contacting responsible employers. We negotiate all preliminary overtures.

Established 1915
THE NATIONAL BUSINESS BOURSE
H. H. Harrison, Director
20 W. Jackson Blvd., Chicago

HELP WANTED

MACHINE TOOLS—Large and well known machine tool manufacturer with unusual record of progress in development of new machine tools needs young man of excellent ability and character for field work. College training in mechanical or electrical engineering is essential. Practical machine shop experience extremely valuable. Eventually this man, if he makes good during a severe training period, will have an excellent sales position. Starting salary $35 to $45 a week plus traveling expenses. No obligation. William L. Fletcher, Inc., Personnel Managers and Counselors, Eight Newbury Street, Boston.

PLANT ENGINEER OR SUPERINTENDENT. An old established manufacturing concern expanding its personnel for future organization is looking for a man capable of working up to full charge production, personnel and engineering. Should be mechanical engineer with experience in operation of Gray Iron Foundry and Machine Shop. Experience in Power Transmission, Elevating and Conveying Machinery would be advantageous but not necessary. Give full particulars in first letter as to experience, age and salary expected. Address Box S-300, care *The Iron Age*, 239 W. 39th St., New York.

MECHANICAL ENGINEER—B. S. Graduate with at least two years' machine design. Preference given to young man under thirty with experience in pumps or other equipment involving stuffing box, bearing and shaft problems. Opportunity to step into depression proof, key position in small company located Western New York. Give full particulars and salary expected. Address Box S-334, care *The Iron Age*, 239 W. 39th St., New York.

SUCCESSFUL PRODUCTION MANAGER WANTED. Must be able to direct production and set rates. Company operates machine, structural and assembling shop with small foundry in connection. Position permanent and paying one to right man with old successful concern in Ohio. None but experienced man with established records will be considered. Address Box S-317, care *The Iron Age*, 239 W. 39th St., New York.

MACHINE SHOP FOREMAN and Machine tool demonstrator, experienced in rough turning steel forgings on turret lathes and boring mills. Steady work, good wages, good opportunty. State experience and qualifications and salary expected. All replies strictly confidential. Address Box S-298, care *The Iron Age*, 239 W. 39th St., New York.

SALES ENGINEER covering New York and New England to take on as a side line the acquiring of orders for special machinery or parts made to customer's specifications and blue prints. Prefer man with established clientele. Address Box S-326, care *The Iron Age*, 239 W. 39th St., New York.

HELP WANTED

WANTED. ROLLING MILL SUPERINTENDENT for permanent position with a high class, established company. Please state prior experience, references that can be supplied, when you would be available and acceptable salary. Address Box S-303, care *The Iron Age*, 239 W. 39th St., New York.

PLANT SUPERINTENDENT for wire mill in New York Metropolitan district; Master Mechanic; experience in maintenance of buildings and machinery. State qualifications and references completely. Address Box S-332, care *The Iron Age*, 239 W. 39th St., New York.

DRAFTSMAN, experienced in detailing structural steel and steel plate work. Give experience and salary desired. Permanent employment with unusual opportunities for advancement. Apply at once to Box S-315, care *The Iron Age*, 239 W. 39th St., New York.

SALESMAN EXPERIENCED—Valves, fittings, pipe and tubes. Write stating past connections and territory covered. Salary and commission basis. P. O. Box 7, Hudson Terminal Annex, New York City.

SITUATIONS WANTED

STEEL ERECTION MANAGER, 38, graduate Engineer, long successful administrative experience with erection all sizes and kinds of bridges and buildings, desires to take over Erection Department of some progressive plant. Good organizer and thorough executive who gets lowest costs and fast completions. Available after reasonable notice given present employer. Address Box 7626-A, care *The Iron Age*, 802 Otis Bldg., Chicago, Illinois.

MAN AT PRESENT EMPLOYED, ten years with mid-west metal stamping plant. Thorough knowledge selling, purchasing, estimating, costs, and traffic. Twenty years' experience in purchasing and selling. Well acquainted with the trade. Desire change for further opportunity. Address Box S-339, care *The Iron Age*, 239 W. 39th St., New York.

RE-ORGANIZATION MAN—ENGINEER: Experience covers investigations and reports for financial, accounting and manufacturing concerns; cost analysis, process and production control, shop layout, development of equipment, rigging up molding machines in specialty and jobbing gray iron and steel foundries. Address Box S-314, care *The Iron Age*, 239 W. 39th St., New York.

PLANT ENGINEER or CHIEF DRAFTSMAN Experienced in Structural, Civil, Mechanical and some electrical engineering. Fourteen years as chief draftsman in present position for a large industrial concern. Age 38. New York State License. Address Box S-331, care *The Iron Age*, 239 W. 39th St., New York.

GENERAL MANAGER, CHIEF OR CONTRACTING ENGINEER—20 YEARS' STRUCTURAL STEEL BUILDING EXPERIENCE WITH VARIOUS FABRICATORS. ADDRESS BOX S-338, CARE *THE IRON AGE*. 239 W. 39TH ST., NEW YORK.

MANUFACTURERS REPRESENTATIVES contacting power plants and metal working industries in Chicago District desire additional lines on commission basis. Well established Sales Engineers, familiar with field. Address Box S-328, care *The Iron Age*, 239 W. 39th St., New York.

GRAY IRON FOUNDRY SUPERINTENDENT or foreman. Sixteen years' executive experience. Practical on floor and machine molding, core floor and cupola practice. Address Box S-329, care *The Iron Age*, 239 W. 39th St., New York.

TRAVELING SALESMAN, competent, aggressive, experienced. Wide acquaintance with industrials, City, State, Federal Departments, Middle Atlantic States, seeks connection. Address Box S-274, care *The Iron Age*, 239 W. 39th St., New York.

MANUFACTURERS REPRESENTATIVE covering Cleveland and Northern Ohio, desires additional established lines, Steel Products, Malleable and Steel Castings. Address Box S-335, care *The Iron Age*, 239 W. 39th St., New York.

SITUATIONS WANTED

WANT TO REPRESENT MACHINERY or Equipment Manufacturer. Married man. Gentile. 25 years' sales experience. Executive type. Pleasant personality. Better than average sales record. Well acquainted Industrial Field. Highest recommendation as to character and ability. Now active Eastern territory. Experience in shop practice and metallurgy. Willing to make headquarters anywhere. Your correspondence solicited and held confidential. Address Box S-337, care *The Iron Age*, 239 W. 39th St., New York.

EXECUTIVE, TWENTY YEARS' EXPERIENCE, SALES MANAGER, GENERAL MANAGER, STRUCTURAL STEEL FABRICATING INDUSTRY. AVAILABLE SEPTEMBER 1st. ADDRESS BOX S-340, CARE *THE IRON AGE*, 239 W. 39th ST., NEW YORK.

ROLLER—Age 37, active, 13 years' experience, wire, strip, shapes. Belgian mills. Conscious of cost, quality and quantity. Address Box S-333, care *The Iron Age*, 239 W. 39th St., New York.

SELLING a line of electric tools, grinders, ventilating fans, to industrials and public service companies. Would like to take on an additional line on resale basis. Address Box S-327, care *The Iron Age*, 239 W. 39th St., New York.

HAMMERMAN, open for a position on Rings and Sleeves. Have made a specialty of that class of work. Address Box S-323, care *The Iron Age*, 239 W. 39th St., New York.

EXPERIENCED MAN DESIRES POSITION selling tool & alloy steels. No objection to traveling. Highest references. Address Box S-291, care *The Iron Age*, 239 W. 39th St., New York.

THE MONTH OF VACATIONS

except for the Help Wanted Department of The Iron Age—it always works and well, as the letters from our advertisers would indicate. They appreciatively tell us that The Iron Age does the work in getting the men they want.

ADVERTISERS INDEX

A

Albert & Davidson Pipe Corp... 143
American Air Compressor Corp... 142
American Brass Co., The..... 20
American Chemical Paint Co.... 137
American Foundry Equipment Co. 75
American Gas Furnace Co..... 133
American Hollow Boring Co.... 124
American Monorail Co., The.... 66
American Rolling Mill Co., The.. 21
American Safety Table Co..... 141
Ames, W., & Co..... 118
Archer & Baldwin, Inc..... 142
Armel, James P..... 142
Armstrong-Blum Mfg. Co..... 82
Armstrong Bros. Tool Co..... 71
Athenia Steel Co., The..... 118
Atlas Car & Mfg. Co., The.... 72

B

Baird Machine Co., The.....116
Baker Bros., Inc..... 69
Baker-Raulang Co., The..... 114
Baldwin-Southwark Corporation Southwark Division 19
Baltimore Malleable Iron & Steel Casting Co. 125
Bardons & Oliver..... 118
Beatty Machine & Mfg. Co..122, 141
Belmont Iron Works..... 129
Belyea Co., Inc..... 142
Bethlehem Steel Co..... 26
Bissett Steel Co., The..... 70
Bixby, R. W., Inc..... 145
Bliss & Laughlin, Inc..... 93
Boerum Co., A. L..... 143
Bradley, C. C., & Son, Inc.... 134
Brassert, H. A., & Co..... 129
Buffalo Mchry. Co., Inc..... 140
Buffalo Wire Wks. Co., Inc..... 137
Business Opportunities Section.. 144

C

Cadman, A. W., Mfg. Co..... 143
Canton Fdry. & Mach. Co..... 128
Carborundum Co., The....12-13, 22
Carnegie-Illinois Steel Corporation 8-9
Cattie, Joseph P., & Bros..... 143
Champion Sheet Metal Co., Inc.. 126
Cheney, S., & Son..... 124
Chicago Electric Co..... 142
Chicago Flexible Shaft Co..... 132
Chicago Perforating Co..... 130
Cincinnati Bickford Tool Co., The 67
Cincinnati Grinders Incorporated 59
Cincinnati Machinery & Supply Co. 140
Cincinnati Shaper Co., The.... 4
Clearing House Section.....138-143
Cleveland Cliffs Iron Co., The.. 18
Cleveland Steel Tool Co., The... 121
Cleveland Tool & Supply Co., The 128
Cleveland Worm & Gear Co.... 147
Columbia Steel Co..... 8-9
Conco Engineering Works..... 127
Cone Automatic Mach. Co., Inc. 118
Contract Manufacturing Section 143
Crawford, F. H., & Co., Inc. .. 141
Crosby Co., The..... 116
Crucible Steel Castings Co..... 125
Cutler Hammer, Inc..... 148

D

Davenport Locomotive Works.. 127
Detroit Hoist & Machine Co... 127
Detroit Rex Products Co..... 78
Donahue Steel Prods. Co..... 140
Dony, D. E., Machinery Co. ... 141
Dreis & Krump Mfg. Co..... 122
Dunbar Bros. Co. Div. of Associated Spring Corp..... 135
Duriron Co., Inc..... 85

E

Earle Gear & Mach. Co..... 128
Eastern Machine Screw Corp. The 121
Eastern Machinery Co., The.... 138
Eastern Tool & Stpg. Co., Inc... 143
Edge Hill Silica Rock Co..... 132
Electric Controller & Mfg. Co... 79
Electric Hoist & Motor Co..... 142
Electro Metallurgical Co..... 2
Elyria Belting & Machinery Co., The 141
Employment Exchange Section.. 145
Espen-Lucas Mach. Wks., The.. 121
Essley, E. L., Mchry. Co., The.. 140

F

Fast Bearing Co., The..... 140
Fate-Root-Heath Co., The..... 111
Flexrock Co. 136
Flinn & Dreffein Co..... 129
Forging and Casting Corporation, The 14
Foster, L. B., Co., Inc..... 143
Frank, M. K..... 143
Franklin Mfg. Co., The..... 143

G

Gibson, Wm. D., Co., Div. of Associated Spring Corp. 121
Goldman, Harvey, & Co..... 139
Goodman Electric Machinery Co., 141, 142
Goss & DeLeeuw Mch. Co..... 118
Grammes, L. F., & Sons, Inc... 74
Great Lakes Steel Corp..... 6-7
Greenpoint Iron & Pipe Co., Inc. 143
Griffin Mfg. Co., Inc..... 124

H

Hanna Furnace Corp., The..... 136
Harnischfeger Corp. 115
Harrington & King Perforating Co., The 71
Hassall, John, Inc..... 134
Hayward Co., The..... 126
Hendrick Mfg. Co.....130, 137
Hill-Clarke Mchry. Co..... 138
Hindley Mfg. Co..... 137
Horsburgh & Scott Co..... 61
Hubbard, M. D., Spring Co..... 135
Hunter Steel Co..... 142
Hyde Park Fdry. & Mch. Co... 132
Hyman, Joseph, & Sons..... 141
Hyman-Michaels Co. 143

I

Indianapolis Mchry. & Supply Co., Inc. 140
Industrial Machinery Co..... 139
Industrial Mchry. & Motor Co... 141
Industrial Steel Casting Co., The 125
Inland Steel Co..... 23
Iron & Steel Prods., Inc....141, 143
Iroquois Machinery Co..... 140

J

Jones & Laughlin Steel Corp.... 5

K

Kerotest Mfg. Co..... 141
Knox, Earl E., Co..... 142

L

Laclede Steel Co..... 123
Land, L. J..... 142
Landis Machine Co., Inc..... 24
Latrobe Electric Steel Co..... 123
Lee Spring Co., Inc..... 134
Leland-Gifford Co. 119
Leschen, A., & Sons Rope Co... 83
Lucas Mch. Tool Co., The..... 118
Ludlum Steel Co..... 3

M

Mackintosh-Hemphill Co. 10-11
Maehler, Paul, Co., The..... 83
Malleable Iron Fittings Co..... 125
Marr-Galbreath Machinery Co... 140
Medart Co., The..... 133
Merrell Mfg. Co..... 118
Metal Electric Processing Co., The 143
Michigan Wire Cloth Co..... 118
Midland Steel & Equip. Co..... 143
Miles Mchry. Co.....140, 143
Milne, A., & Co..... 70
Monarch Machinery Co..... 139
Morey Mchry. Co., Inc..... 138
Morris Machinery Co. 141
Motor Repair & Mfg. Co., The.. 142
Moyer J. N..... 141
Mundt, Chas., & Sons..... 130
Murray Iron Wks. Co..... 143

N

National Bearing Metals Corp... 125
National Business Bourse..... 145
National Machine Tool Co..... 143
National Machinery Exchange.. 141
National Steel Corporation..6-7, 136
New Departure Div. of General Motors Corp. 1
Nilson, A. H., Mch. Co..... 130
North American Manufacturing Co., The 63
Nuttall, J. 141

O

O'Brien Mchry. Co., The 140
Ohio Ferro-Alloys Corp..... 77
Ohio Locomotive Crane Co., The 128
Oilgear Co. 76
Olson Mfg. Co..... 143
Ottemiller, Wm. H., Co., Inc... 134

P

Page Steel & Wire Div. American Chain & Cable Co., Inc.. 117
Parker-Kalon Corp. 134
Pels, Henry, & Co., Inc..... 122
Pittsburgh Crushed Steel Co... 132
Pittsburgh Lectromelt Furnace Corp. 132
Plymouth Locomotive Works.... 111
Poor & Co., Canton Forge & Axle Works 124
Pratt & Whitney Div. Niles-Bement-Pond Co. 54
Prichard Supply Co..... 142
Progressive Mfg. Co., The..... 118

Q

Quigley Co., Inc..... 131

R

R. & S. Machinery Co. 141
Ridgway, Craig, & Son Co..... 127
Ritterbush & Co., Inc..... 139
Robbins & Myers, Inc..... 127
Rockford Drop Forge Co..... 124
Roebling's, John A., Sons Co... 17
Rosenkranz, Weisbecker & Co., Inc. 139, 140
Rustless Iron & Steel Corp..... 113
Ryerson, Jos. T., & Son, Inc... 124

S

Samuel, Frank, & Co., Inc..... 135
Scaife, Wm. B., & Sons Co..... 129
Screw Machine Products Corp... 134
Scully-Jones & Co..... 142
Seneca Wire & Mfg. Co., The.. 137
Sessions, J. H., & Son..... 126
Simmons Mch. Tool Corp..... 139
Simonds Mfg. Co., The..... 128
Standard Milling Co. 142
Standard Pressed Steel Co..... 134
Stanhope, R. C., Inc..... 142
Stanley Works, The..... 123
Steiner, George 143
Strand, N. A., & Co..... 121
Superior Bronze Corp..... 143

T

Tennessee Coal, Iron & Railroad Co. 8-9
Thomas Machine Mfg. Co..... 82
Thomson-Gibb Elec. Welding Co. 84
Toledo Stamping & Mfg. Co.... 126
Torrington Co., The..... 129
Transue & Williams Co..... 65
Treasury Dept. 144

U

U. S. Steel Corp. Subsidiaries.. 8-9
U. S. Steel Products Co..... 8-9
U. S. Steel Wire Spring Co..... 134

V

V & O Press Co., The..... 123
Victor Machinery Co. 140

W

Waldron, John, Corp..... 128
Wanted Section 143
Warner & Swasey Co.....80-81
Waterbury Farrel Foundry & Machine Co., The..... 16
Weatherly Foundry & Mfg. Co. 143
Webb Wire Wks., The..... 137
Weldit Acetylene Co. 75
West Penn Machinery Co..... 139
Wetherell Bros. Co..... 123
Wheelock, Lovejoy & Co., Inc... 64
Whiting Corp. 128
Wickwire Spencer Steel Co..... 131
Windsor-Richards, Son & Co., Ltd. 144
Wood, A. M., & Co., Inc..... 142
Worcester Stamped Metal Co... 126
Wright Mfg. Div. American Chain & Cable Co., Inc..... 117
Wyckoff Drawn Steel Co..... 60

Y

Youngstown Sheet & Tube Co., The 15

Z

Zeh & Hahnemann Co..... 123

CLASSIFIED SECTION

Business Opportunities 144
Clearing House 138-143
Contract Manufacturing 143
Employment Exchange 145
Wanted 143

TEN eloquent words from the letter of a customer whose large plant is isolated by miles and days from sources of replacement parts—and whose equipment is so generally operated by Cleveland Worm Gear Drives that the failure of even a single unit might have tied up the whole plant.

But *didn't!* His "Clevelands" had been installed 8 years previously and still showed no effects of wear when he wrote the above.

Examining at random the records of thousands of other Cleveland Worm Gear Speed Reducers installed 10, 15 or more years ago, reveals that this type of report is rather usual, not at all exceptional.

Wherever *your* plant may be, you can safeguard the earnings of your production equipment and go far toward stabilizing profits by installing "Clevelands"—the worm gear speed reducers that serve indefinitely with "not a moment of delay —not a penny of cost."

The Cleveland Worm & Gear Company, 3252 East 80th Street, Cleveland, Ohio.

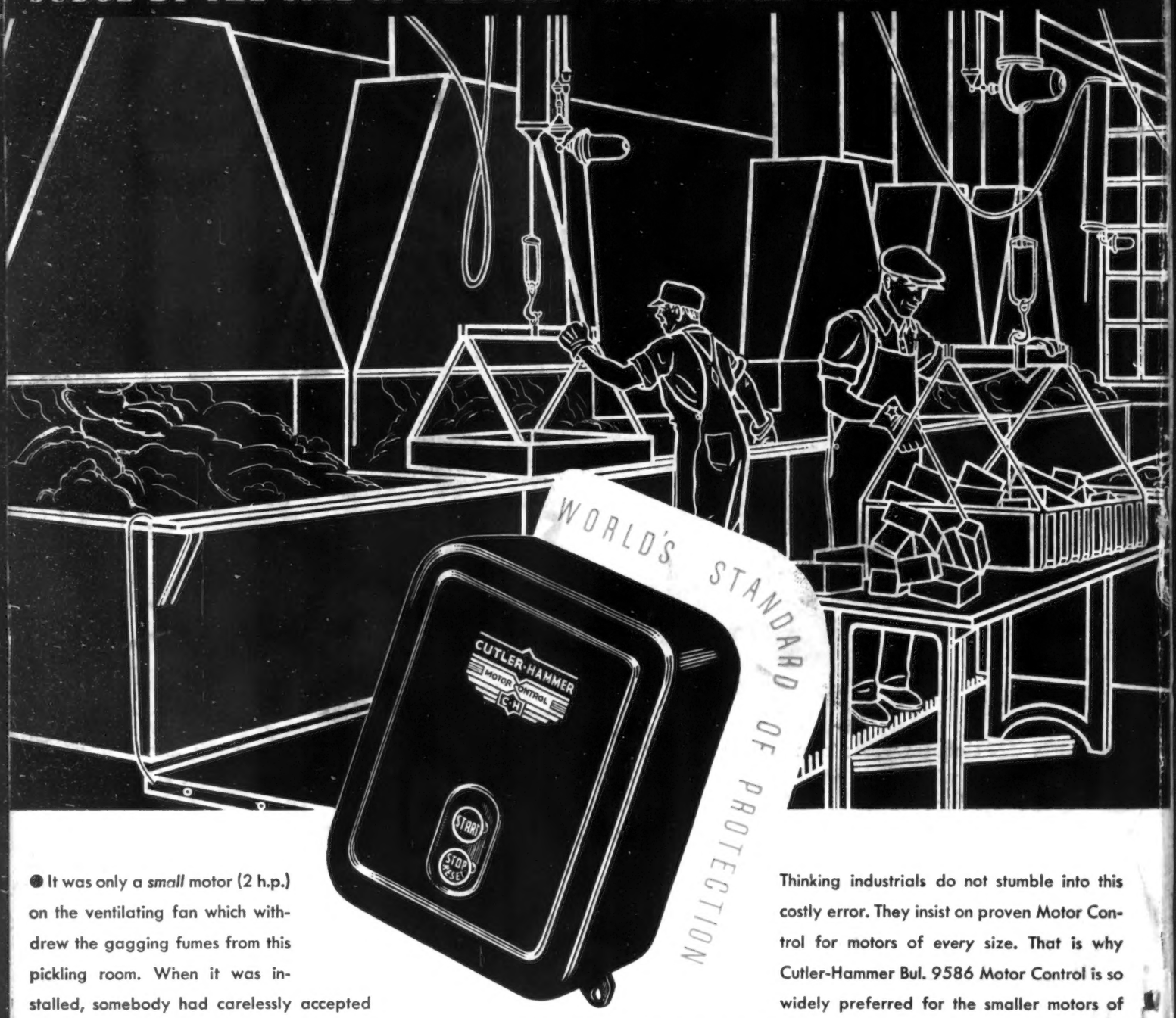
Affiliate: The Farval Corporation, Cleveland, Manufacturers of Centralized Systems of Lubrication

★

CLEVELAND *Worm Gear Drives*

A SMALL MOTOR MAY CHOKE AN ENTIRE FACTORY

JUDGE BY THE SIZE OF THE JOB · NOT BY THE SIZE OF THE MOTOR



● It was only a *small* motor (2 h.p.) on the ventilating fan which withdrew the gagging fumes from this pickling room. When it was installed, somebody had carelessly accepted inferior Motor Control, never recognizing the importance of the installation. When the motor failed and the fan stopped, it took more than an hour to restore normal operations. The price of a careless attitude toward the importance of *small* motors and their Motor Control is too high to hazard.

FOR SMALL MOTORS

Built to a standard of millions of operations with heavy solid silver twin-break contacts and the famous C-H eutectic alloy overload relay. Featured as standard equipment by responsible machinery builders and stocked by reliable independent electrical wholesalers. Cat. 9586 AAA.

CUTLER-HAMMER
MOTOR CONTROL
C-H

Thinking industrials do not stumble into this costly error. They insist on proven Motor Control for motors of *every* size. That is why Cutler-Hammer Bul. 9586 Motor Control is so widely preferred for the smaller motors of Industry. Its many features of superior construction, its legacy of the widest engineering experience and its unequalled record of performance *must* recommend it to you. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus,* 1325 St. Paul Ave., Milwaukee, Wis.